

American Cinematographer

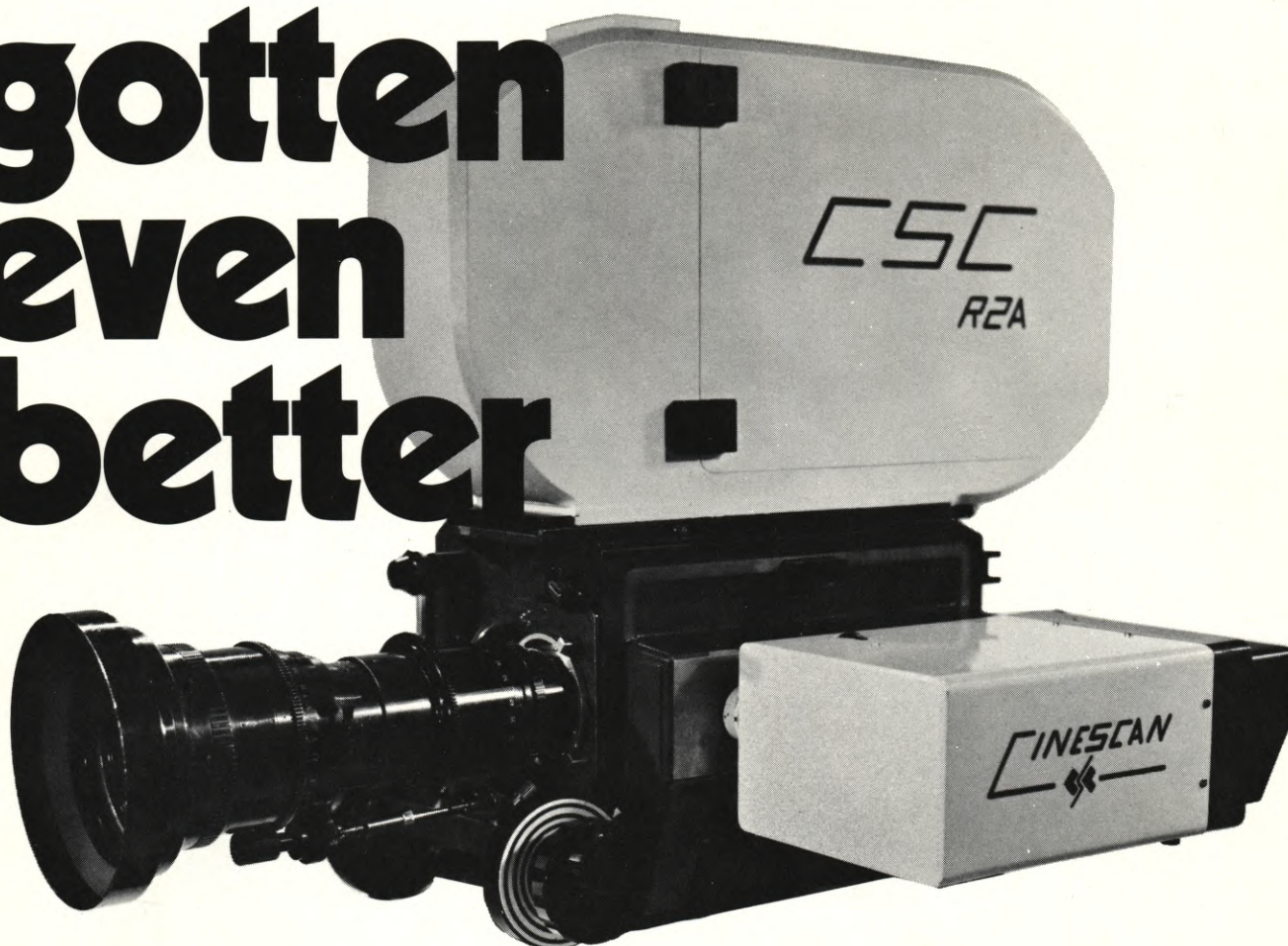
International Journal of Motion Picture Photography and Production Techniques

APRIL, 1978 / \$1.50



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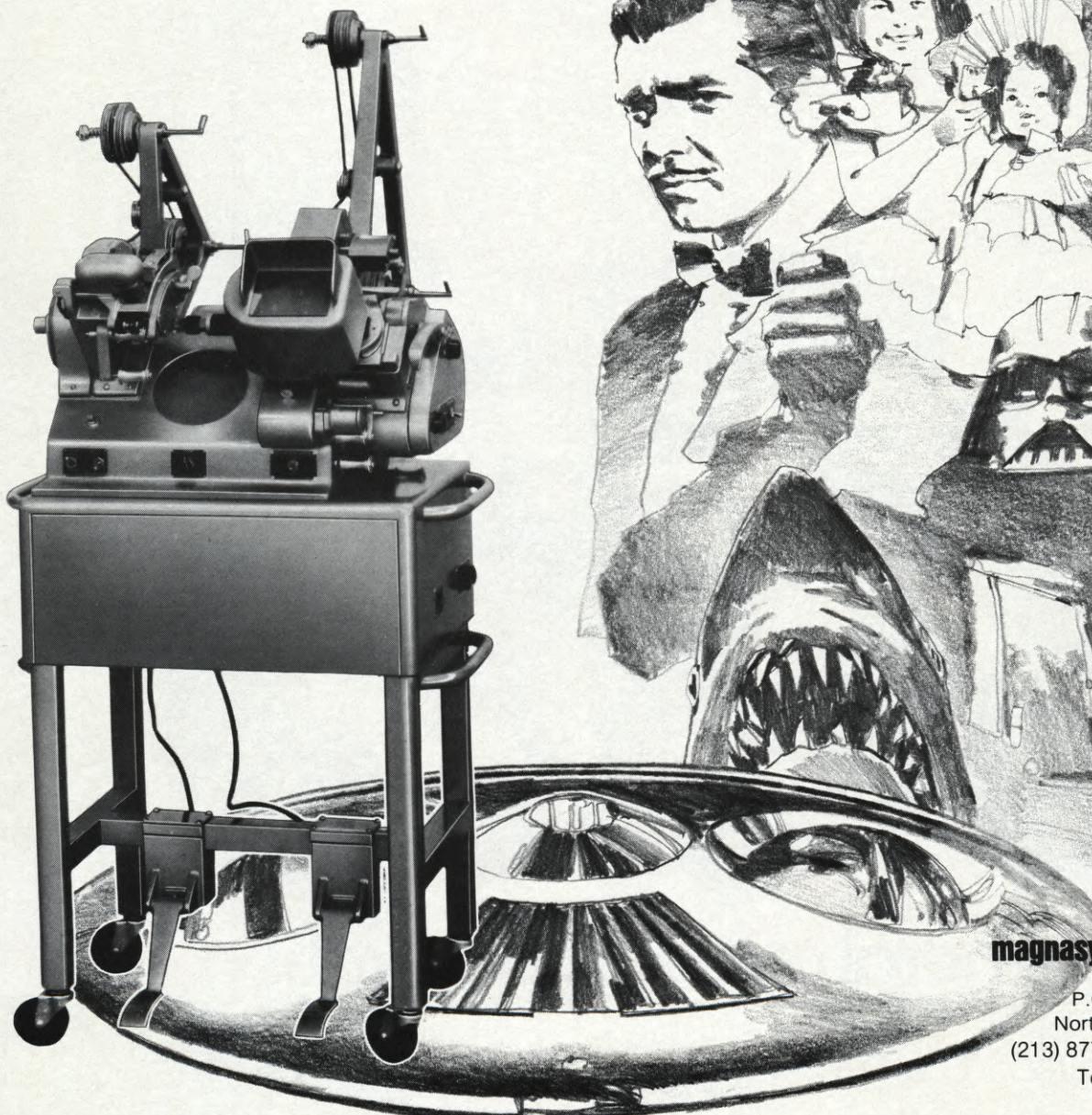
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American Cinematographer

International Journal of Motion Picture Photography and Production Techniques

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APRIL, 1978

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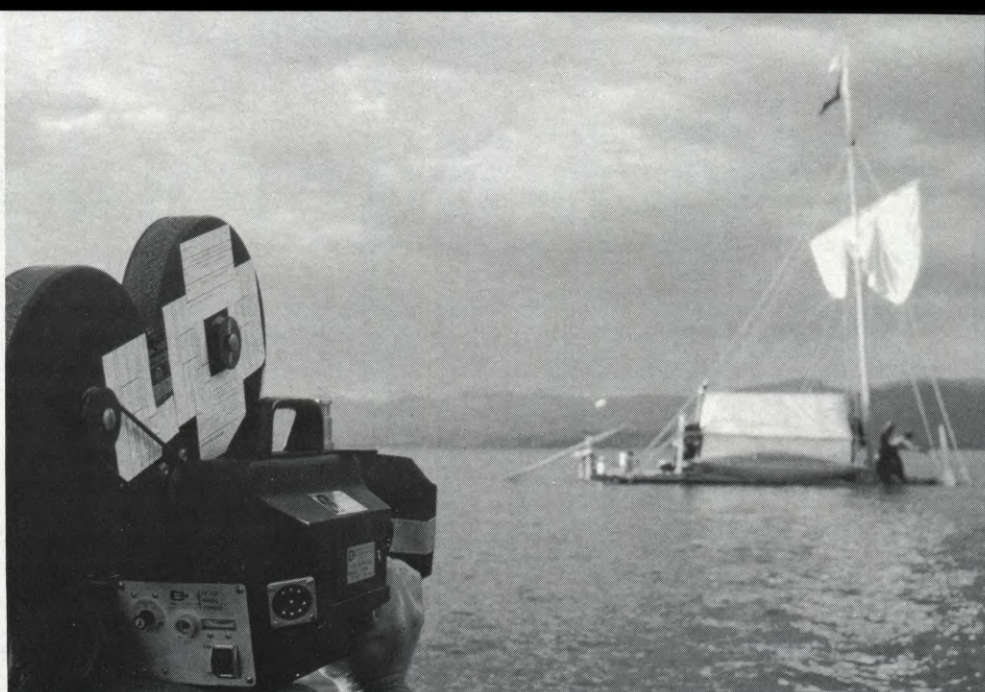
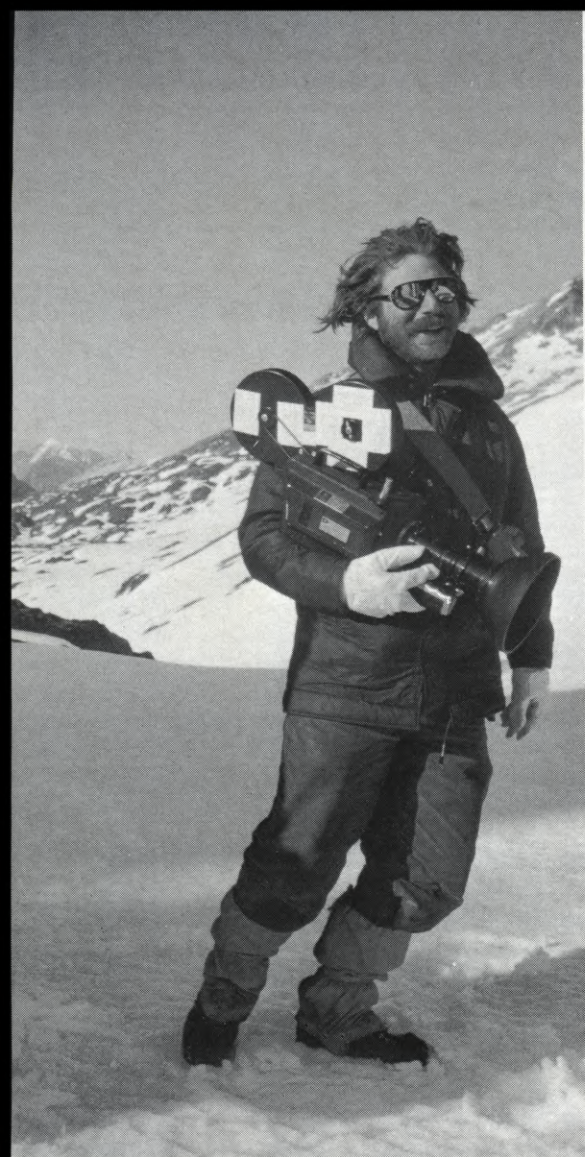
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ON THE COVER: Camera Operator John Fleckenstein rides the mechanical Great White Shark to get an "over-the-fin" shot for a climactic sequence in "JAWS 2", a Zanuck/Brown production for Universal release, directed by Jeannot Szwarc and photographed by Michael Butler.

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"Silence in the Yukon is the most total I have ever experienced, quieter than any sound studio... Our voices would echo back and forth for miles. Shooting sync-sound at close range was especially demanding, but the CP-16R was wonderfully quiet."

Eric S. Camiel
Cinematographer

For more than 100 days, award-winning filmmaker Eric Camiel and his CP-16R kept constant company, filming the ordeal of four men as they retraced the route of the great Klondike Gold Rush of 1898 for "Yukon Passage," a National Geographic television special, co-produced with WQED/Pittsburgh.

"For three and a half months, my CP-16R was my constant companion as we froze and sweated, climbed and fell, working at the limits of fatigue and physical endurance to film the route of the great Klondike Gold Rush of '98," says cinematographer Eric Camiel.

"We hiked over the Chilkoot Pass, 34 miles on foot, over snow and rock. Then we camped at Lake Bennett, in the Yukon Territory (part of a vast semi-arctic region in northwest Canada), the staging area for the raft trip down the Yukon River. There we filmed for three weeks as the four men logged a mountainside, ran the logs down the rapids, and built their raft.

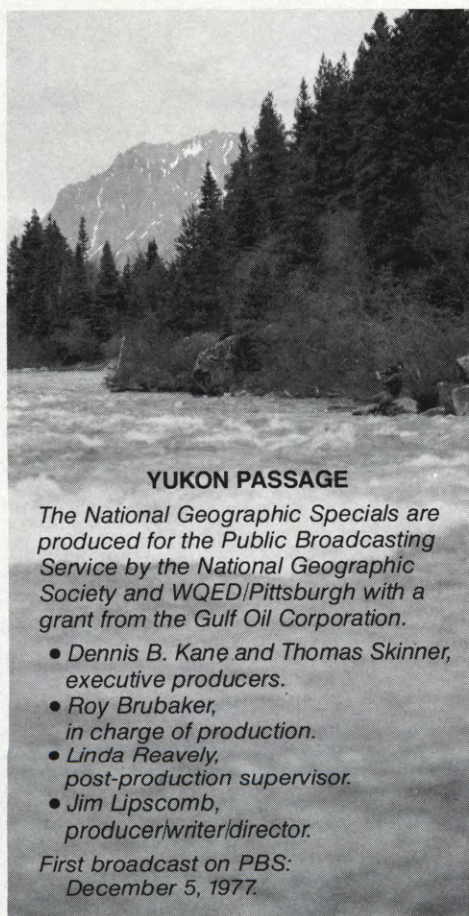
"The raft was rigged with a big canvas squaresail for sailing the 200 miles of lakes to get to the river proper. Riding the spring flood at six knots, we drifted, smashed, and ground our way to the heart of Gold Rush Country, where the Yukon and Klondike rivers meet: Dawson City, a major boom town during the Klondike Gold Rush. From there we rafted down the Yukon River till the

freeze-up, and then out by dog sled.

"The CP-16R was used for three and a half months in the wilderness, shooting over a hundred 400' rolls of 7247 color negative, operating in a temperature range of 10° to 95°F with no problems," says Eric Camiel. "It ran seven to nine magazines per NC-4 battery, even in cold weather."



Camiel being helped to camera position up the bank. "No wonder the camera fell so often..." says Camiel.



YUKON PASSAGE

The National Geographic Specials are produced for the Public Broadcasting Service by the National Geographic Society and WQED/Pittsburgh with a grant from the Gulf Oil Corporation.

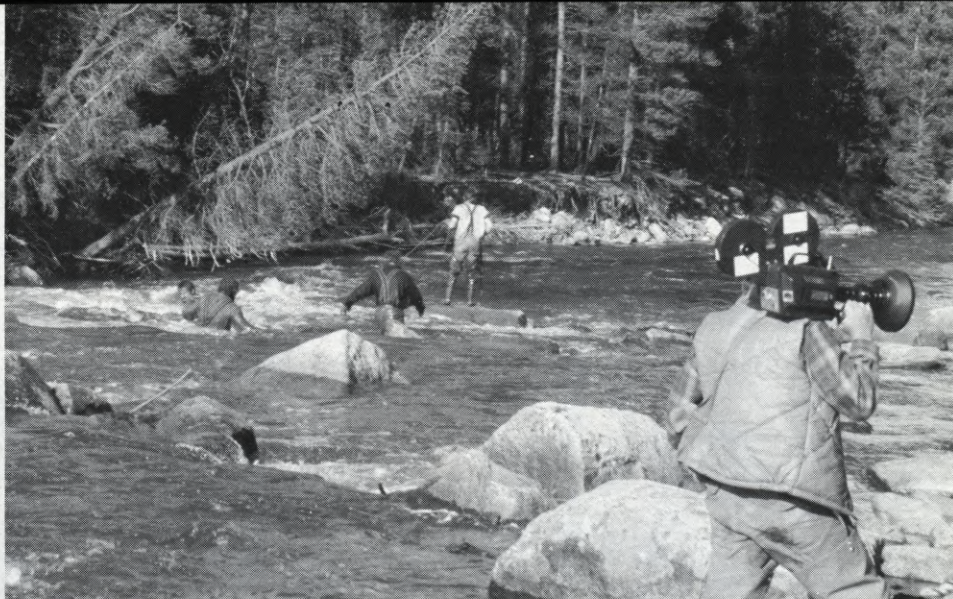
- Dennis B. Kane and Thomas Skinner, executive producers.
- Roy Brubaker, in charge of production.
- Linda Reavely, post-production supervisor.
- Jim Lipscomb, producer/writer/director.

*First broadcast on PBS:
December 5, 1977.*

Photographs by David Clark, Jerry Wallace and Robert Clark.



"Dollying" across on a cable to film the running of the rapids.



Bringing logs for the raft downstream.



Lake Laberge, Yukon Territory. Paul Crews, member of the 4-man raft crew, and Eric Camiel (filming) on the raft. The CP-16R is protected by a special CP raincover. The sudden storms on this lake claimed the lives of many men in 1898.



case clips onto a backpack frame."

"There was very little special equipment used," says Camiel. "I did build a lightweight waterproof padded case that holds the camera, in a ready-to-shoot format, plus accessories. The camera goes in and out easily, and the



Left to right: Cinematographer Eric Camiel, producer/writer/director Jim Lipscomb and soundman David Clark. "Yukon Passage" was shot double system with Nagra sound recording equipment.

"Like a cat with nine lives, the CP-16R kept on shooting despite the incredible abuse to which it was subjected."

"The weather was quite erratic, with frequent rain squalls, and the CP raincover had to go on and off several times a day.

"The camera was dropped three times, once sliding forty feet down a snow bank. Occasionally it got wet with spray and rain. Each time, I just dried it off and kept shooting.

"Once, while I was changing magazines, the wind blew sand into the open camera. I cleaned it out and kept shooting. The worst problem, though, was the fine abrasive dust that filled the air any time we were near the gravel-paved roads. It got into everything, and eventually ruined my lens. Still, the camera kept shooting.



The "Yukon Passage" team

"I was really amazed that the camera kept functioning through it all. Like a cat with nine lives, the CP-16R just kept on shooting despite the incredible abuse to which it was subjected."

"I know of no other camera that could have served me as well."

"Silence in the Yukon is the most total I have ever experienced, quieter than any sound studio. No cars, no airplanes, no insects — nothing but silence. Our voices would echo back and forth for miles. Shooting sync-sound at close range was especially demanding, but the CP-16R was wonderfully quiet.

"Inevitably in this type of filming, there is a lot of waiting, the camera on your shoulder or by your side, ready to shoot. The ability to put the camera down safely, and grab it and start shooting immediately is crucial. The second saved in getting the camera to your eye and

turned on is often the crucial second that gets the all-important start of the action on film. The CP-16R with its plug-in battery, broad flat camera bottom and convenient handle placement proved extremely handy under these conditions. The camera balances beautifully on my shoulder, and I can easily hold it there for a 400' take.

"I know of no other camera that could have served me as well. The rugged reliability of the CP-16R, and the confidence it inspired in me, allowed me to take chances far away from any backup camera, risking the CP-16R to get a shot in situations where I wouldn't have dared to go with other cameras. And it shows directly in the quality of the finished film, not just in spectacular shots and difficult camera angles, but in the amount of detailed coverage that the camera encouraged me to get: the type of material that makes a film come alive."

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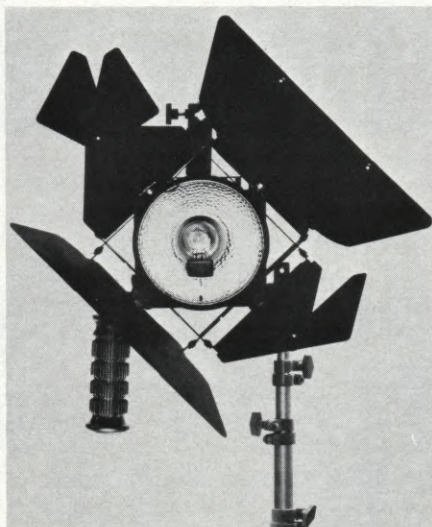


NEW NOSE CONE MOUNT

In conjunction with Clay Lacy Aviation of Van Nuys, Continental Camera Systems announces the release of the Nose Cone Camera Position. Fitted to a Lear Jet 25, the nose cone is placed in position after removal of the radar cone package and is fitted with an optically correct dome right in the front of the aircraft. Maximum field of view is 220°. Cameras acceptable to the system are Arriflex S 16mm, Arriflex Ilc 35mm and R.C.A. T.K. 76, plus other small E.N.G. cameras. The whole system is F.A.A. approved and has blown air heater ducts piped from the cabin to keep the dome clear of condensation at altitudes of 43,000'. Full video monitoring is part of the system for both the cameraman and pilot. Quick release catches mount the nose cone to the Lear 25 so that upon landing the engines of the Lear Jet can be kept running while fast magazine changes are made. The nose cone is added to the Astrovision System, enabling the director to film or tape dynamic shots at high speed air to air or air to ground shots in either wide angle or zoom shots. All controls are made by the cameraman in the comfort of the pressurized cabin of the Lear Jet 25.

The Nose Cone System has been fully field-tested and had its premier on filming sequences in the Grand Canyon for the point of views of "Superman" for the upcoming movie of the same name. Demonstration tapes are available. The Nose Cone Camera is added to Continental Camera Systems' range of products designed specifically for 2nd unit production.

For further information, contact: Continental Camera Systems, Inc., 16800 Roscoe Boulevard (Van Nuys Airport) Van Nuys, California 91406 (213) 989-5222.



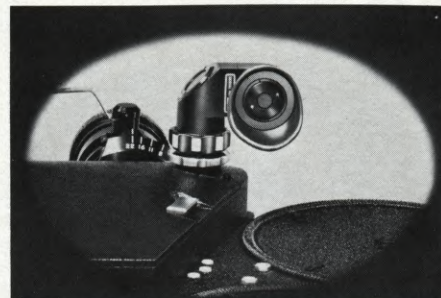
NEW LOWEL OMNI-LIGHTS NOW AVAILABLE

Lowel-Light Mfg., Inc., specialists in the manufacture of high quality, lightweight, location lighting equipment for motion picture, video and still photographic applications, has announced that their long-awaited Omni-Light is now available for delivery through over 300 authorized Lowel equipment dealers in the U.S., Canada, Mexico and abroad.

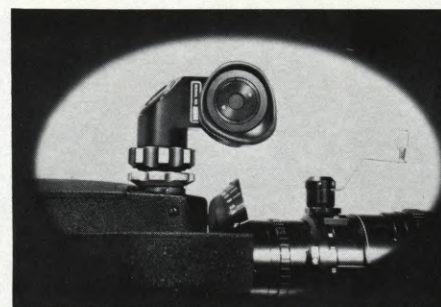
The remarkably compact Lowel Omni-Light is a focusing spotlight featuring an extremely broad spot-to-flood focusing range, and an extensive system of front end accessories which enable the user to tailor the light's output to handle many location lighting situations. The Lowel Omni-Light is equally at home operating from 110 or 220/240 volt line sources or an available 30 volt battery supply for complete field freedom with appropriate lamps and cables. The "fold-away" design of its comfortable handle, stand fitting and accessory bracket, make it as convenient to store and get to-and-from locations, as it is to use on the job. Present owners of the popular Tota-Light system will appreciate the fact that most of their accessories, including the Tota-brella and gel frame holder are completely compatible with the new light, adding much to its flexibility. Lowel is also introducing five new location lighting kits at this time, based

around Omni-Lights and Omni/Tota-Light combinations.

Complete information on the Lowel Omni-Light and Lowel Omni-System is available through Lowel-Light Mfg., Inc., 421 West 54 St., N.Y., N.Y. 10019, or 3407 West Olive Ave., Burbank, Calif., 91505.



(ABOVE:) New Frezzi Viewfinder positioned for normal viewing by operator. (BELOW:) New Frezzi Viewfinder positioned for operator looking down from directly overhead.



NEW FREZZI VIEWFINDER IN PRODUCTION

Frezzolini Electronics Inc. introduced production-line models of its *Frezzi Viewfinder* for its professional 16mm "Frezzi-Flex®" motion picture (ciné) cameras at the exhibit of the Company's Export Agents, Cinecraft International, Inc., at the "Film '77" Conference held in London, England in July 1977. Frezzi Viewfinders are now in production at the plant in Hawthorne, New Jersey, U.S.A.

Originally designed and produced for use on the Frezzolini® Frezzi-Flex® Model FR-16 ciné cameras, Frezzi Viewfinders are also available for the CP reflex cameras as well.

Supplied as "standard" equipment on the Model FR-16, the Frezzi Viewfinder features optimum balance and weight distribution with its length of less than one (1) inch (less than 25.40mm) from the film plane (ideal for "off-the-shoulder" filming).

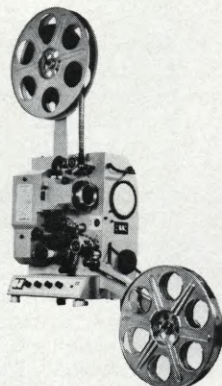
Other features of the Frezzi Viewfinder are its large magnification of approximately 10:1; mirrors (instead of prisms) to provide brighter images; an eyepiece with backlight shutter (dowser); adjustability in a range of ± 5 diopters. The View-

Continued on Page 413

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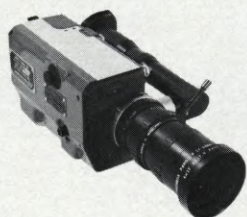
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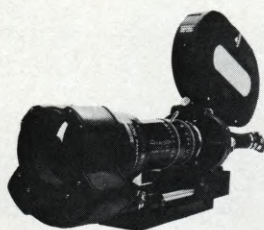
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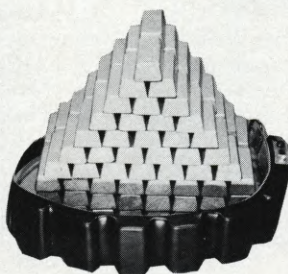
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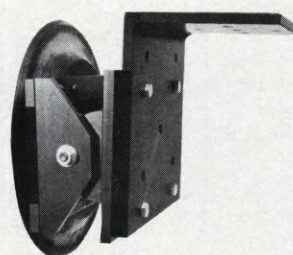
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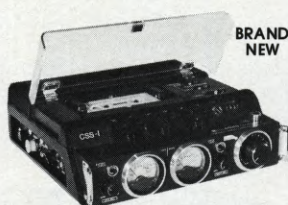
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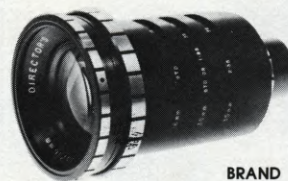
The camera mount designed to be attached to curved, irregular or flat surfaces.



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Kinoptik	and many more.



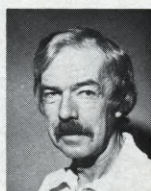
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This hand-holdable telephoto lens virtually eliminates the mirror lens "hot-spot" in both still and ciné photography.

Mirror lenses allow the use of long effective focal lengths without the extreme length and bulk of refractive lenses. But the bane of the mirror lens has been the troublesome "hot-spot"; unevenness of illumination from center to edge of a full f-stop or more as simulated below.



Typical reflex—lens hot-spot.



Vivitar solid CAT reflex lens.



The optical design of the Vivitar Series 1 600mm f8 solid catadioptric lens virtually eliminates the "hot-spot." The fall-off in illumination from center to edge is one-third of an f-stop or less.

In addition to solving the "hot-spot" problem, the Vivitar 600mm CAT is an exceptionally durable and stable lens. Spherical elements are combined to

form what is a virtually solid element, thus eliminating the large air spaces and low tolerance to shock and temperature changes found in conventional mirror lenses. In fact, the primary element is 42.7mm thick.

At 100 yards the Vivitar 600mm CAT produces the same image on the 35mm format that a 50mm lens produces at 25 feet. An experienced photographer can hand-hold this compact lens at shutter speeds that would normally be impossible with a 600mm refractor type lens.

The lens is fully compatible with popular 35mm SLR cameras and is also a spectacular optic for 16mm ciné cameras accepting "C" mount adapters. The image produced on 16mm film is approximately equivalent to the image of a 2000mm lens on 35mm still film.

Like all mirror lenses the Vivitar 600mm telephoto lens has a fixed aperture. Exposure is controlled with shutter speeds and the use of neutral density filters supplied with the lens.

Vivitar's 600mm solid CAT is no futuristic pipe dream. It is in production and available now at Vivitar dealers.

Specifications: Focal length: 600mm. Aperture range: f8 (fixed f-stop). Construction: 9 elements, 7 groups. Angle of acceptance: 4° Weight: 1.36kg (3 lbs.). Length: 8.4cm (3.31 in.). Diameter: 10.6cm (4.18 in.). Accessory size:

35.5mm at the rear of the lens, inside the T-mount. Filters included are Series 1 VMC close tolerance UV haze, K2, 4X-ND, and 25A.

Closest focusing distance from film plane: 7 meters (23 feet).

Screw-in hood, detachable tripod socket, filters, lens case, front and rear lens caps included.

Mounts available to fit Nikon, Canon, Minolta, Konica, Olympus OM, Pentax, and universal thread mount cameras.

Vivitar Corporation, 1630 Stewart St., Santa Monica, California 90406. In Canada: Vivitar Canada Ltd./Ltée



Vivitar® Series 1™ 600mm f8 solid catadioptric lens.

"I may be working on the other side of the world, but a call to TVC brings me home."



"TVC is professionalism personified. Their technical expertise is complemented by a very human understanding of the art of film.

"The people at TVC speak the language of the filmmaker. I may be working on the other side of the world, but a call to TVC brings me home...in touch with members of my professional family—people whose skill and judgement I trust, whose storehouse of technical knowledge I can always consult.

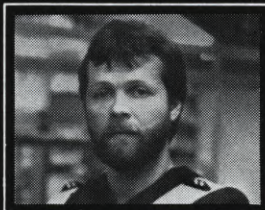
"TVC is more than a lab—it's a working, caring, creative part of the film-making process. On loca-

tion it's the shoot—not afterwards, when it's too expensive or impossible to re-shoot.

"Wherever I am, shooting documentaries for Mobil Corporation in Sumatra or Steuben Glass in Afghanistan, I call the lab about the film I'm sending them. When I'm at the ends of the earth, it's good to know that TVC is at the other end.

"When you come down to it, you're only as good as your lab. I strive for the best from myself, and I get the best from TVC."

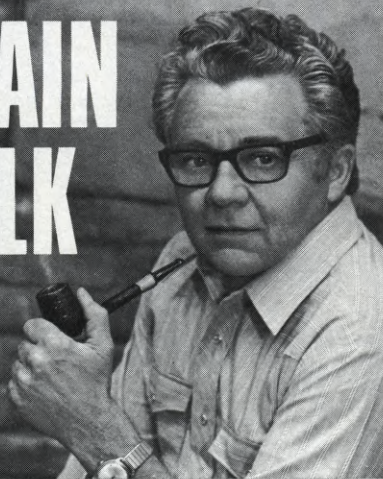
Francis Kenny Director, Cameraman



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PLAIN TALK



by *J. Carl Treise*

We find it amazing that some firms will be suckers for a low price tag — not once, but several times!

We've seen it happen again and again.

A firm will order a film processor, wait for it weeks (and sometimes months) beyond the promised delivery date, discover it doesn't perform to specifications . . . and still reorder from the same guy the next time around!

Why? Is it the few bucks saved on a meaningless quote? Is it a locked-in habit pattern? Or just further proof of P. T. Barnum's famous statement?

Before you order a film processor from any manufacturer (— it doesn't matter who it is), find out who some of his customers are and ask them a few questions.

Does he have a reputation for prompt delivery? Will he build exactly what you want? Will the processor do everything it's supposed to do? If something goes wrong, will he come back and make it work?

In other words, does he really care, or just pretend he does?

If we sound tough on this subject, we mean to be. We're upset by any manufacturer who promises first-rate gear and delivers marginal equipment. But we're bothered even more by any buyer who doesn't take the trouble to look for the difference!

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QUESTIONS & ANSWERS

Conducted by CHARLES G. CLARKE, ASC.
and WINTON HOCH, ASC.

(Inquiries are invited relating to cinematographic problems. Address:
Q. & A., AMERICAN CINEMATOGRAPHER, P.O. Box 2230, Hollywood, Calif. 90028.)



Q I have been hearing much recently about the technique called "blue backing". What exactly is "blue backing" and how/why can it be used as an effective matte? Also, what is the particular tonal hue of blue necessary to achieve "blue backing"?

A The term "blue backing" refers to a traveling matte system used in composite photography.

The foreground subject is photographed in front of a painted or projected blue screen, much like Process Rear Projection. This element is later composited over a film background by means of an optical printer.

The color or tonal hue of the blue backing must be such that, with narrow band separation filters, a traveling matte can be obtained from the processed color negative. This matte must be able to provide a perfect silhouette matte of the foreground action and a clear background.

The matte is then used to hold back the area in the film background, while the reverse of the matte is used to hold back the blue in the foreground to make an effective composite scene.

Howard A. Anderson, Jr.
Editor's note: Pages 587 to 611 of the AMERICAN CINEMATOGRAPHER MANUAL contains a full description of the Blue Backing and other matte making techniques.

Q I have recently purchased an underwater housing for my Beaulieu camera with a 10mm f1.8 lens. I recently tried this outfit in an indoor swimming pool but everything was out of focus. When I shot a diver out of the water with this housing the scene was sharp, but when I followed him into the water he was out of focus. Could it be the dome over the lens or dome-to-lens distance? I chose a simple lens to use underwater so there is no focus adjustment. What could be the problem?

A As your scenes out of the water are sharp, the dome and dome-to-lens distance are apparently okay. Your prob-

lem is that the focus has to be altered for underwater scenes because the refraction index of water is 1 to 1.33, causing objects to appear closer by one-fourth. Normal photographic lenses, as well as the human eye, are designed to focus correctly when the front surface of the lens is in contact with the air. Underwater, the optical change is an increase of approximately twenty-five percent in the focal length of the lens.

If you can focus through the lens by eye with your outfit, then there is no great problem. But, if you cannot, you must pre-set the focus. The focus should be set at 75 per cent of the actual distance. For example, if the subject underwater is 10 feet from the camera, the focus should be set at 7½ feet!

You are wise in using a wide-angle lens for your underwater scenes because of its greater depth-of-field and also because of the water's magnifying effect. The AMERICAN CINEMATOGRAPHER MANUAL carries a discussion on Underwater Cinematography on page 431.

Further information regarding the use of the dome port was furnished by the questioner in reply to the above answer:

Ikelite recommends, when using a dome port, the focus must be pre-set by some means to twelve (12) inches, then the image will be in focus at almost all distances, underwater only.

In an article appearing in the December, 1973 SMPTE JOURNAL, Filp Schulke discusses the use of domes, plus diopters, extension tubes and physically moving the film plane in order to focus. ■

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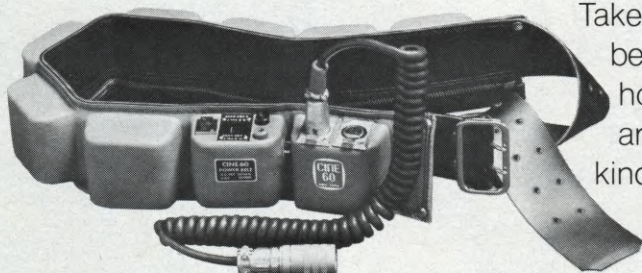
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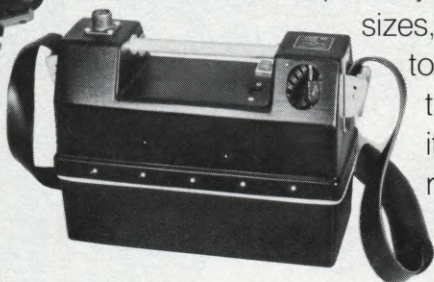
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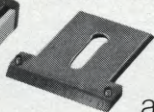
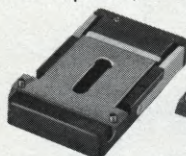


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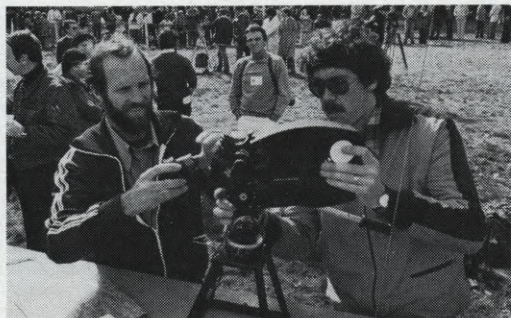
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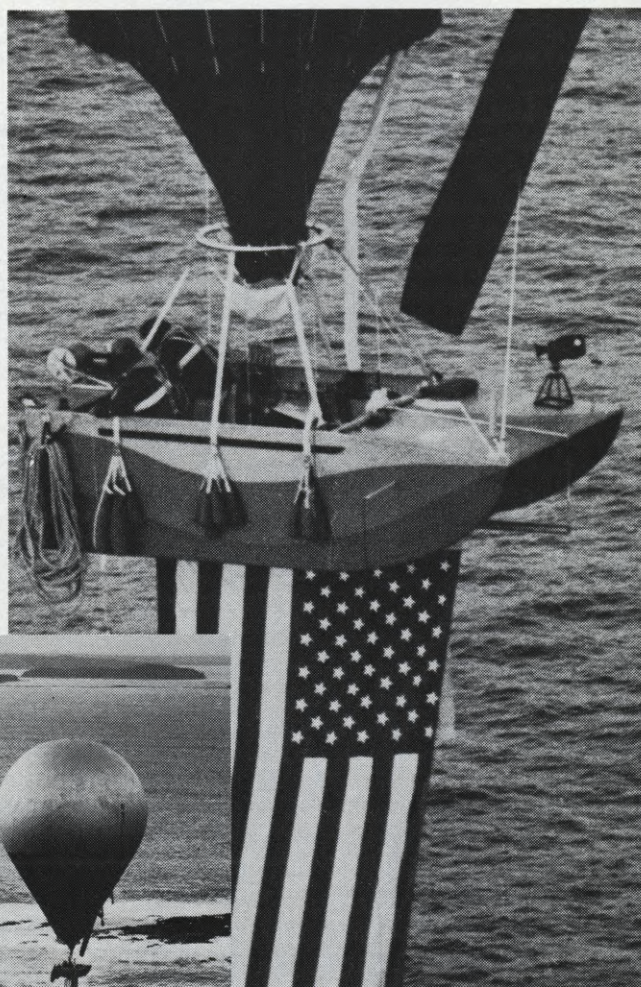
"Shooting in sync sound during the flight of a helium balloon is extremely critical. Since the balloon moves silently with the wind, there is no wind sound to mask camera noise. That's why it was so important to use the STUDIO QUIET French Eclair ACL."

"The instant snap-on magazine was another big asset. And the ACL LED-7 system made it easy to determine exposure quickly and accurately."

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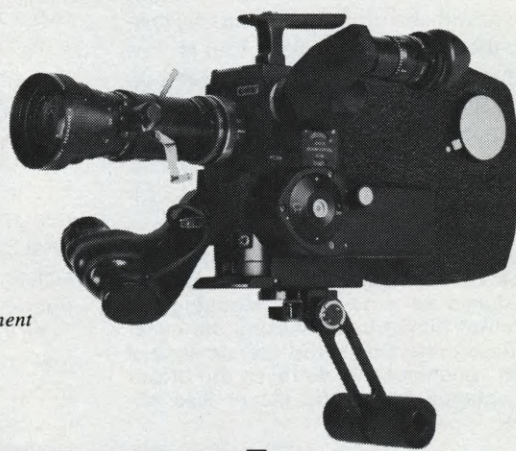


Len Aitken and Bill Snider of Oak Creek Films check equipment prior to take-off



The Eagle starts its journey across the Atlantic

The ACL in position on the gondola



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CINEMA WORKSHOP



By ANTON WILSON

SHUTTERS IV

During the years I spent with the Arri-flex Corporation, I must have been asked at least a million questions concerning every imaginable technical aspect of the Arri line of cameras. Just when I thought I had heard them all, someone would come up with an esoteric question from left field: "What kind of filter do you recommend for filming a seance?", "My Arri S just fell into a vat of chocolate, what should I do?" (Ans: Dark chocolate, open up two stops), "I'm going to a country where the current is 287 volts at 42½ cycles per second, what kind of sync motor should I use?"

Obviously, most of these questions were unique and hopefully I had to answer each only once. However, there were several questions that were veritable standards. The most popular was: "How come the Arri mirror shutter has a black painted stripe in the middle of the mirror?" A reasonable question. After all, the main purpose of the mirror is to reflect the brightest image possible onto the ground glass, so why would you reduce the amount of reflecting surface by painting part of the mirror black? (See FIGURE 1)

When the mirror reflex shutter was first introduced, it caused quite a reaction in the film industry. Almost everyone is now familiar with the obvious attributes. However, there is one drawback that is now taken for granted, FLICKER. Camera-men were not accustomed to the image turning on and off while they were attempting to compose a frame. Arnold & Richter decided it would be wise to re-

duce this flicker effect to a minimum, as some cameramen were bound to find it objectionable. The obvious way to reduce flicker would be to decrease the dark or off period of the shutter. This was impractical because it would mean a smaller shutter opening and less light for the film. The less obvious way would be to reduce the perceived flicker by increasing the effective flicker rate. This cure is based on a very important phenomenon of motion pictures, the *critical flicker frequency*.

Early experimenters in motion pictures found that, due to the so called "persistence of vision", (the eye/brain holds an image for a short instance after that image is removed) motion could be perceived from a series of still pictures. They established that these pictures had to be flashed at a rate of approximately 16 a second or faster for the sensation of relatively smooth motion. However, there was still a flicker. In other words, the simulation of motion was successful, but the viewer was still aware of the flicker. The situation is identical to a mirror reflex camera where the motion in the image is real, but flickering.

The key to the solution was the "critical flicker frequency". This is the rate at which the eye will no longer perceive the two distinct areas. For example, consider a disc that is half white and half black and you can only see a portion of the disc through a small aperture. As the disc begins to rotate, you will see alternately white and then black in this "window". Eventually the disc can be made to spin fast enough so that the window will appear a smooth gray with no apparent flicker. That point is the critical flicker frequency.

As it relates to motion pictures, the critical flicker frequency turns out to be about 45 images per second. Thus, 16 fps projectors were designed with three shutter blades to create 48 images per second on the screen. In essence, each "frame" was projected three times in succession on the screen. To this day, all 24/fps projectors have twin-bladed shutters to create 48 images per second. One of the blades does block the image from the screen during pull-down, but the second blade merely interrupts the image to double the flicker rate. The result is no

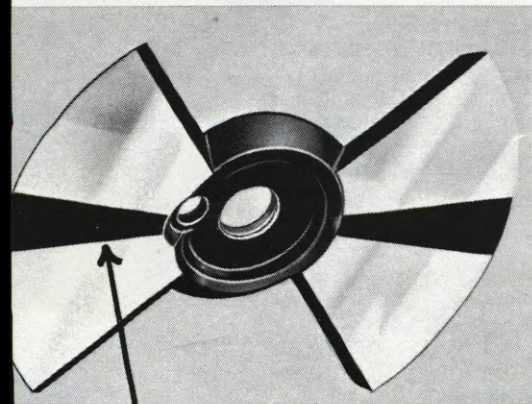
perceptible flicker.

The black painted band on the mirror shutter is exactly like the dummy blade in the projector. It breaks up the image to produce two flashes for each frame. The result is a reduction in perceived flicker with negligible loss of brightness. The flicker is only partially reduced because the stripe is extremely small compared to the large opening for exposure.

With the advent of behind-the-lens exposure meters, it became imperative that the mirror shutter stop in the viewing position. Electronic controls were added to the motor to halt the shutter at the proper point, but the black stripe had to go. By breaking the mirror into two smaller areas, the stripe created "targets" too small for the electronic controls to hit accurately. The newer cameras with BTL meters have no stripe—just one large mirror segment. In addition, some camera designs (such as the CP-16R) employ shutters which are too compact for dual segments.

It appears that the intriguing black stripe may be a thing of the past. ■

FIGURE 1—Arrow points to painted black stripe on Arriflex mirror reflex shutter, introduced as a means of reducing the perceived flicker by increasing the effective flicker rate. Due to the "persistence of vision" phenomenon, doubling the flicker rate actually makes the flicker less obvious.



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The following members of the American Society of Cinematographers have indicated their availability to appear for seminars, lectures, informal discussions and questions and answers pertaining to motion picture and television photography, lighting, special photographic effects and production in general: L. B. "Bud" Abbott, Lloyd Ahern, Taylor Byars, Stanley Cortez, Victor Duncan, Linwood Dunn, Daniel Fapp, George Folsey, Lee Garmes, Richard Glouner, Burnett Guffey, John L. Hermann, Gerald Hirschfeld, Winton Hoch, Michel Hugo, Richard Kelley, Milton Krasner, Vilis Lapieniks, Andrew Laszlo, Jacques Marquette, Richard Moore, Sol Negrin, Frank Phillips, Owen Roizman, Joseph Ruttenberg, Howard Schwartz, Richard Shore, Frank Stanley, Alan Stensvold, Mario Tosi, Ted Voigtlander, Harry Wolf, and Vilmos Zsigmond.

Arrangements as to availability and other details are to be made directly with the individual A.S.C. member. For further information, contact: American Society of Cinematographers, P.O. Box 2230, Hollywood, California 90028. Telephone: (213) 876-5080.

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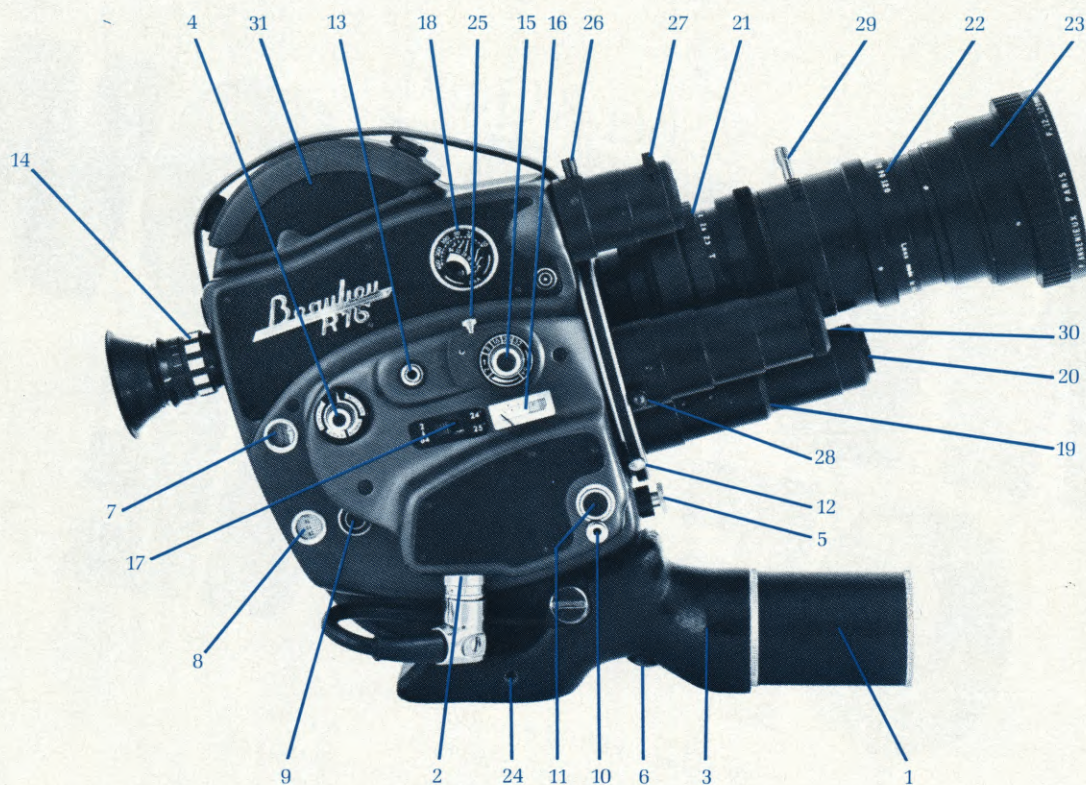
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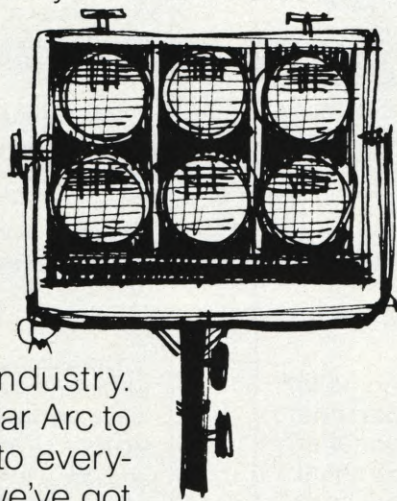
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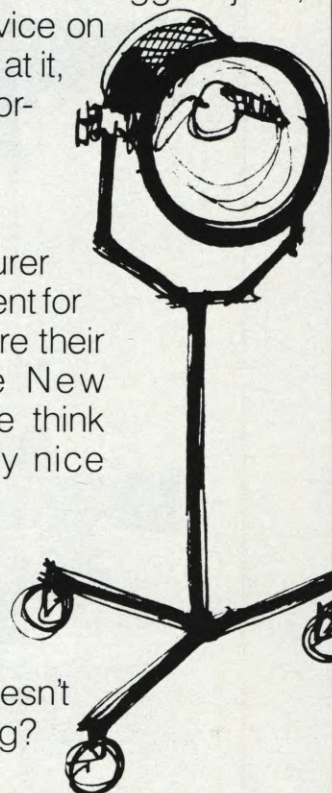


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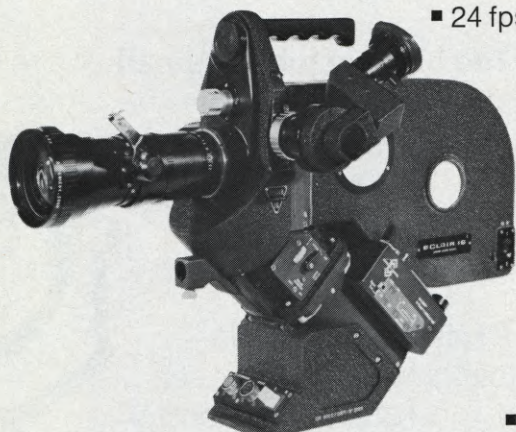


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THE BOOKSHELF

By GEORGE L. GEORGE

FACETS OF THE CINEMA

Nazi propaganda during WW2, in particular the prominent part played in it by film, is impressively discussed in *THE WAR THAT HITLER WON* by Robert Edwin Herzstein. Itemized are the newsreels, documentaries and dramatic features used by Goebbels in his manipulative persuasion drives (Putnam \$15.).

David Frost's account of his Nixon television interviews, *"I GAVE THEM A SWORD"*, provides a fascinating inside view of the thorough technical preparations that Frost made for the project. It also gives us an insight into his interrogative methods, cutting sharply through Nixon's equivocations and digressions—an historic media document and probably the only public trial the former President will ever have (Morrow \$9.95).

In *THE MAKING OF THE WIZARD OF OZ*, Aljean Harmetz paints a broad, well documented canvas of Hollywood in the mid-30's, a fascinating world in which film production was enmeshed in a vast web of intrigues, power struggles and feuds, and when it took MGM 2 years, 4 directors and 10 writers to make this all-time box office champion (Knopf \$12.95).

Miles Kreuger tells in *SHOW BOAT* the fabulous story of the successive metamorphoses—novel to musical to film—of Edna Ferber's 1920 best-seller. His research is monumental, his iconography exceptional and his style eminently readable (Oxford U. Press \$25.).

The leading ladies who graced Republic Studios' films in the good old days are surveyed in *THE HEROINE OR THE HORSE* by Thomas Burnett Swann, an appealing, well illustrated book that sums up aptly the dilemma confronted by the hero in most Republic movies (Barnes \$17.50).

The British Film Institute has issued several brochures distributed here by N. Y. Zoetrope (31 E. 12 St., NYC 10003) that cover a variety of significant subjects. *FASSBINDER* by Tony Rayns and *RIVETTE* by Jonathan Rosenbaum examine the work of the German and the French director in their impact on cinematic style (\$2.80 ea). *GAYS IN FILMS*

by Richard Dyer discusses the stereotypes prevailing in most films (\$2.80). **NEW CINEMA IN SPAIN** by Vicente Molina-Foix expertly assesses Spanish films since the end of the Civil War (\$2.30). In **STRUCTURAL FILM ANTHOLOGY**, Peter Gidal defines the structural/materialist concept of cinema with special attention to avant-garde movies (\$2.80).

The work of jazz musicians, either appearing on screen or contributing to the sound track of some 2500 films produced between 1917 and 1977, is covered in David Meeker's **JAZZ IN THE MOVIES**. This unique and exhaustive guide, arranged by film title, includes a short synopsis and essential music and production data (Arlington \$12.95).

★ ★ ★

THE REFERENCE SHELF

Twelve issues of **FACTFILE** published during the last year by the American Film Institute's National Educational Services make available basic reference material about film and television. Titles include "Careers in Film/TV", and "Women in Film/TV", all thoroughly researched and geared to the needs of students, educators and filmmakers (AFI members \$2. ea., non-members \$3. ea.).

The financing of films has undergone profound changes since the enactment of the 1976 Tax Reform Act. In **TAX SHELTERS AFTER TAX REFORM**, edited by Ruth G. Schapiro, an important chapter is devoted to motion picture and their current potential as sheltered investment (Practising Law Institute, 810 7th Ave., NYC 10019; \$30.).

The "complete book of daytime dramas," **SUPER SOAPS** by June Kutler and Patricia Kearney traces the origins and evolution of this entertainment form with its daily audience of 50 million. Fifteen of the most popular programs are examined in their everyday routine, writing and production techniques, plot intricacies and performers' personalities (Grosset & Dunlap \$5.95).

★ ★ ★

FILMMAKERS ALL

Busby Berkeley, Howard Hawks, Merwyn LeRoy and John Huston are among the 19 directors profiled by William R. Meyer in **THE WARNER BROTHERS DIRECTORS**. Covering the silent era through the 60's, this broad survey treats knowledgeably of an imposing group of talented craftsmen (Arlington \$20.).

A moving and intimate biography, **JACK BENNY**, written by his widow Mary Livingstone and her brother Hilliard Marks (with Marcia Borie), pictures the comedian in his various roles as husband, father, friend and incomparable performer (Doubleday \$10.).

AP columnist Bob Thomas' **THE ONE AND ONLY BING** is an informative and warm tribute to the late entertainer, recapping his career in a well illustrated text. A complete filmography and a list of Crosby's greatest song hits round out an attractive, large-size volume (Grosset & Dunlap \$14.95/5.95; Ace \$1.95).

In **THE LIFE AND LOVES OF CARY GRANT**, Lee Guthrie offers a well researched biography of the performer, skillfully contrasting his successful screen career with the less fortunate and often hectic circumstances of his private life (Drake \$9.95).

The work and life of the pioneering avant-garde filmmaker, photographer and painter, is assessed by art critic Arturo Schwarz in **MAN RAY: THE RIGOUR OF IMAGINATION**. Creator of surrealist films in the early 20's, Man Ray, with his uniquely original style, is comprehensively evaluated in this superb volume, richly illustrated in color and b&w, that stresses the artist's influence on the esthetic development of his times (Rizzoli \$35.).

A study of avant-garde art, Richard Kostelanetz's **ESTHETICS CONTEMPORARY**, carries a stimulating essay by Prof. Paul Sharits, a filmmaker in his own right, whose views on advanced movie esthetics attach particular significance to a cinema that "defines our environment" and is related to research in media and "meaning" systems (Prometheus \$19.95/9.95).

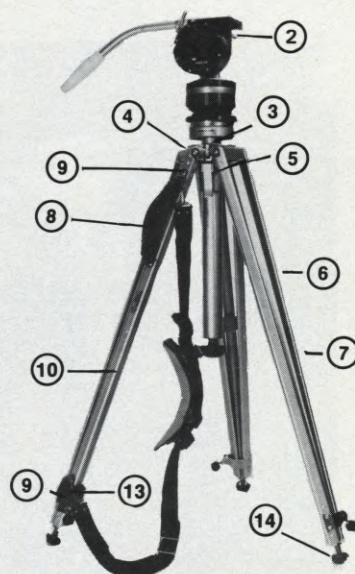
In **SEEING THE LIGHT**, James Broughton comments on filmmaking as conceived by a leading avant-garde craftsman. His poetic musings have some practical overtones, but reflect mostly his Zen-oriented philosophy and Oz-inspired beliefs (City Lights, 261 Columbus Ave., San Francisco, CA 94133; \$2.50).

David Ogilvy, who contributed outstandingly to the visual aspect of advertising, whether in TV commercials or media graphics, has written **BLOOD, BRAINS AND BEER**, a lively and literate sequel to his earlier autobiography. *Confessions of an Advertising Man* (Atheneum \$7.95).



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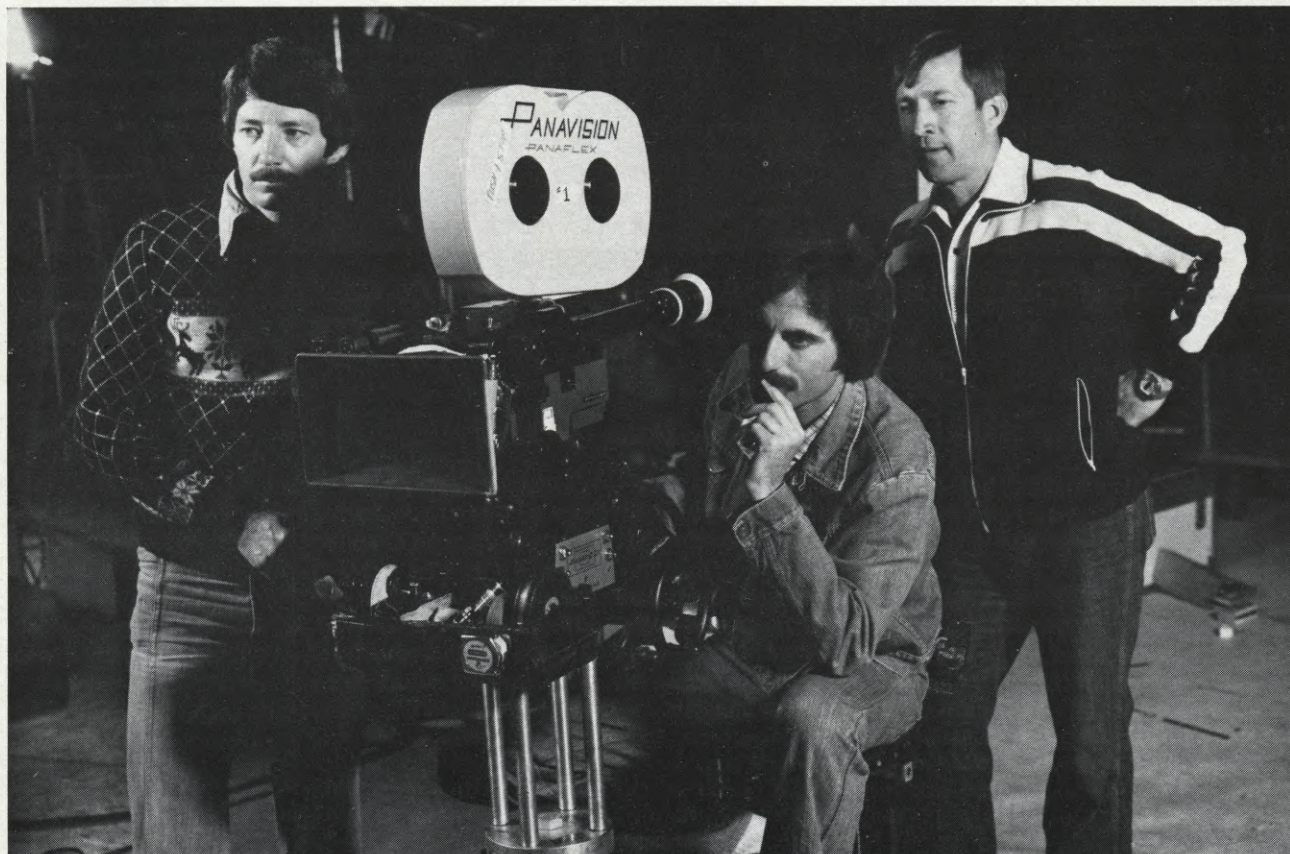
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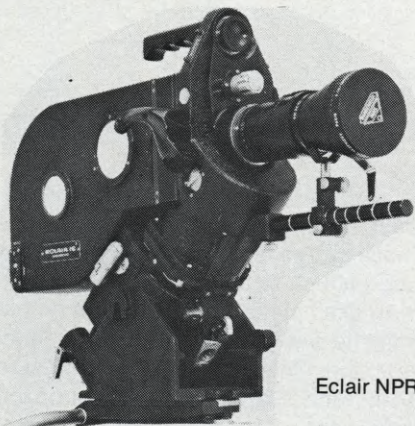
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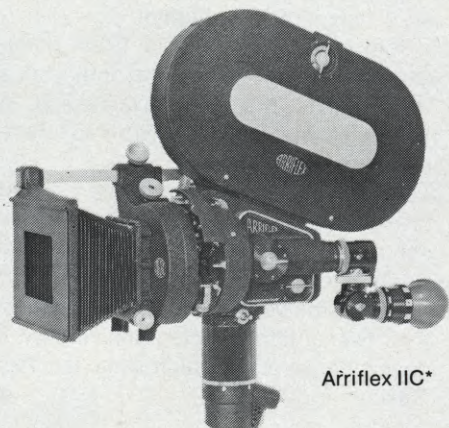
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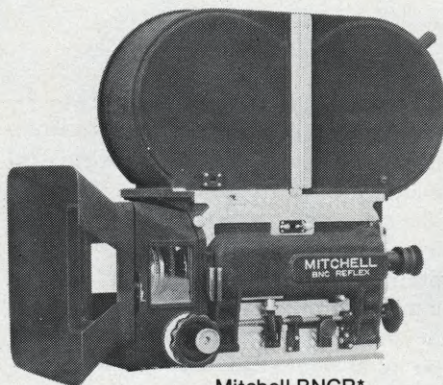
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THE HONOR ROLL



THOMAS E. TUTWILER, A.S.C.

On February 27, 1978, Tom Tutwiler was one of two members of the ASC honored for forty-five years membership in the Society. Fellow members came out that night to pay their respects to Tom as he was presented with a marble desk set on which is mounted a gold-plated tripod and camera.

Tom actually began his career in the movie industry in October, 1926 when he debuted as one of the beer drinking students in Ernst Lubitch's version of "THE STUDENT PRINCE", "OLD HEIDELBERG" at Metro-Goldwyn-Mayer Studios. For reasons not divulged, Tom quit trying to become an actor and got a job in the film loading room of that same studio in March of 1927. From film loading he moved to assistant cameraman and worked with such noted cinematographers as Merritt Gerstad, Henry Sharp, Ira Morgan, and John Seitz. Subsequently he was assigned to the Warren Newcombe (Matte Painting) department as an assistant to Paul Eagler and then in September, 1933 became a Director of Photography. He remained in this capacity until June, 1942 moving to Warner to work for Baron Haskin until he entered the Armed Forces (Army Air Force).

Tutwiler served three years in the Air Corps as both a ground and aerial photographer with the rank of Captain.

In 1946, along with Paul Perry, Gilbert

Warrenton, Harry Perry and Lloyd Knechtel, Tutwiler participated in Operations Crossroads—both the airdrop and underwater atom bomb tests at Bikini. The crew took the motion pictures which were used to study the tests and also for partial exhibition to the public. Back in the United States in 1947 he did both the air and second unit ground photography on Paramount's "BLAZE OF NOON".

Peripetetic best describes the further adventures of Tutwiler. In 1948 and 1949 he traveled Alaska, the Aleutian Islands and Greenland for the Apex Film Corporation doing survival films for the air force. Here again he did both ground and air shooting. For the next ten years he continued to do both ground and aerial photography in pictures such as "THE BRIDGES OF TOKO-RI", "STRATEGIC AIR COMMAND", "THE SPIRIT OF ST. LOUIS", "THE OLD MAN AND THE SEA" and "THE HUNTERS". Of course, little or none of this was photographed in Hollywood.

On his work in "HUNTERS", David Bongard of the Los Angeles Herald said, "The real star of 'THE HUNTERS', an Air Force saga of the jet age which opened yesterday, is the photographer who took the aerial shots—Tom Tutwiler.

"His work affords a bird's eye view (a fast bird, that is) of what the jets look like from other jet cockpits while flying in formation.

"There are several dogfights which

must have kept Tutwiler on his toes. Those babies don't stay in camera range long enough to blink an eye."

An example of the good times he had while he was in the air is put forth in the headline "Mantz Planes in Collision; Both land Safely". While shooting scenes for a TV show, the Lockheed-12 piloted by Mantz hit turbulent air and snapped seven feet off the wing of the other plane. Both planes landed at their airports. (All in a day's work.)

In the early '60s, Tutwiler packed his passport and cameras and traveled all over the world for Shell's "WONDERFUL WORLD OF GOLF".

Born and raised in Leakey, Texas, he completed two years at Texas A. & M. before embarking on his movie career. Leakey, incidently, is the maiden name of his mother and the township of Leakey was settled by and named for John Leakey, a famous Indian Fighter.

Tom joined the ASC in 1933, nominated by John Arnold, and took out a Retired Active Membership in the ASC in 1975. Until that time his motto was "Have Passport—Will Travel".

He and Miriam still travel quite a bit but they don't need passports, they visit their son and daughter in San Francisco and Santa Barbara quite often and were feted in 1977 in their son's home on the event of their twenty-fifth wedding anniversary. It seems to be celebration time for Tom Tutwiler. ■





MEMORANDUM

March 3, 1978

To: Matthews Board of Directors & Staff

Re: Grip Rental?

It has recently been brought to my attention that despite our efforts to serve our customers in the best interest of all concerned (in view of the recent change in ownership and concurrent change in company policy) there are those who allege Matthews to be in the business of renting motion picture equipment. This allegation is false, and is a breach of our ethical responsibilities. I strongly recommend that you take every opportunity to denounce the aforementioned rumor, and while we continue to achieve our goals, please be assured that it will not be at the expense of our customers. We are a company solely engaged in Manufacturing, Service and Sales.

Respectfully,

A handwritten signature in black ink, appearing to read "Ed Phillips", is written over the typed name.

Ed Phillips

President & Chairman of Board

cc: Board of Directors

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PHOTOGRAPHING "THE LAST WAVE"

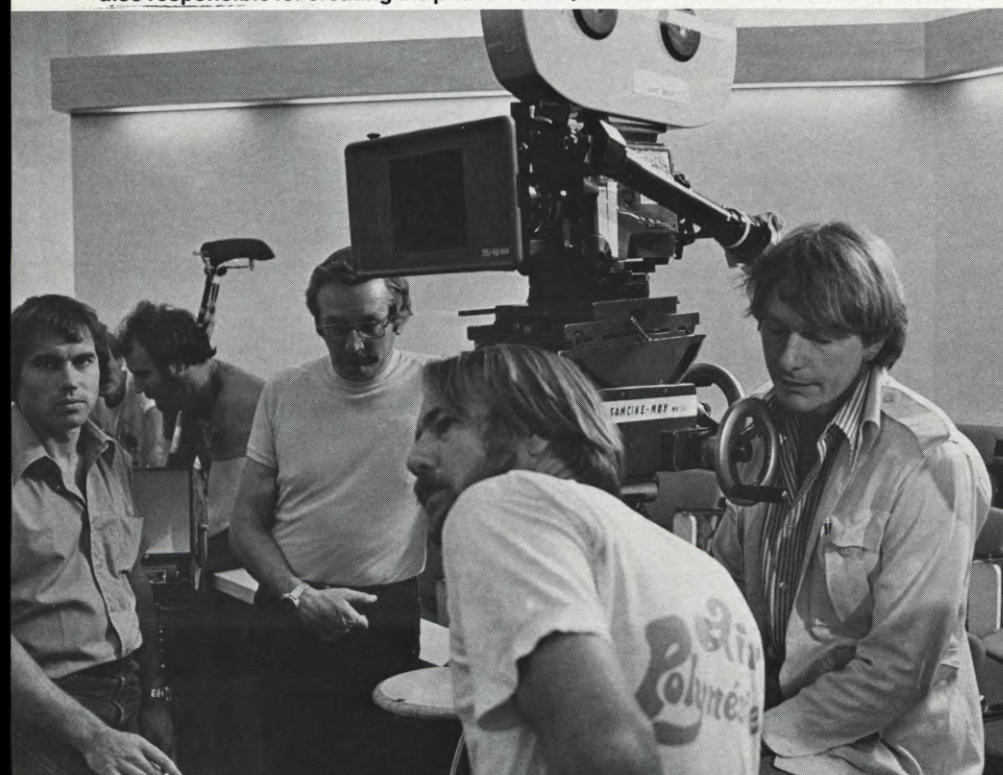
A group of highly talented Australian filmmakers does it again with a superbly crafted feature that makes its point with stunning force

By RUSSELL BOYD, ACS



Inside a dome within a cave beneath the city of Sydney, American film star Richard Chamberlain, surrounded by ancient artifacts, prepares to play a key scene from "THE LAST WAVE", the off-beat Australian thriller which recently won the top award (Golden IbeX) at the VIth Tehran International Film Festival. In foreground (left) Director of Photography Russell Boyd checks lighting contrast.

Key crew members at work on "THE LAST WAVE". (Left to right:) Focus Puller David Williamson, Sound Recordist Don Connolly (hidden), Boom Operator David Cooper, First Assistant Director John Robertson, Director of Photography Russell Boyd, Director Peter Weir. Director Weir, Cinematographer Boyd and Producers Hal and James McElroy were also responsible for creating the phenomenally successful "PICNIC AT HANGING ROCK".



Working with Director Peter Weir on his film "PICNIC AT HANGING ROCK" in early 1975 proved to be such an exciting and stimulating experience that I couldn't wait to start shooting his latest production, "THE LAST WAVE".

Weir generates such an exciting and creative atmosphere on the set, that he draws the best out of cast and crew and this dedication and feeling of being a part of an event is one of the qualities that finishes up on the screen.

The mood and look of the film was discussed long before shooting and it was decided that a cold feeling and sharp images would enhance the story; therefore the use of fogs, diffusions or low-cons, etc., was discounted immediately, as the softening they provide was the last thing we wanted. The script had a hard edge, and so, we decided, should the photography. I was fortunate to have the same camera crew and gaffer as on "PICNIC AT HANGING ROCK", so we settled in very quickly and already had a great understanding of how each other worked.

Camera operator John Seale contributed greatly with imaginative ideas and angles, providing a lot of fluid movements using the Panaflex on an O'Connor head with a mini-jib and Elemack dolly. The system worked very well for shots requiring a little move in or out for dramatic emphasis or small crane shots as actors sat down etc., and was made to work in very confined spaces and in fact saved us time by being able to achieve in one shot, what would normally require two or three set-ups.

"THE LAST WAVE" was my first experience with the Panaflex camera and I was very impressed. I will need a damn good reason to not use it on any feature films that I shoot in the future. The whole Panavision system has been so intelligently designed that I think it actually saves time between set-ups and enables the director to get those one or two extra shots each day, that without the Panaflex, he just wouldn't have time to shoot.

I believe very strongly in getting the best equipment available for the job, as in the long run the convenience and time saved more than justifies any extra expense involved. Equipment breakdowns on a set bore me to tears and just aren't on.

Gaffer Tony Tegg, whose experience

in feature films goes back more years than he cares to remember, including Stanley Kramer's "ON THE BEACH", offered me great support and as he is the Mole Richardson agent in Australia, we had access to some of the best lighting equipment available.

"THE LAST WAVE" is a contemporary story set around the earliest settled part of the city of Sydney with interesting architecture to frame and always close in the background is the reality and powerful presence of the skyscrapers that make up Sydney today. The modern city towering above forgotten generations forms an element that is part of the plot itself.

The two major interior locations were the home of lawyer David Burton (Richard Chamberlain) and a cave beneath the city, unknown to white man, which held the secrets of an earlier civilization and forecast the coming of the "Last Wave".

After an extensive search, a wonderful old stone home was found in Adelaide, South Australia by Unit Manager Bev Davidson and was painted and perpetuated with impeccable taste by Production Designer Goran Warff and Art Director Neil Angwin and crew. During the few weeks of shooting in Adelaide, thousands of gallons of water were poured on the home, inside the home, through windows, down the stairs and on the garden and street outside.

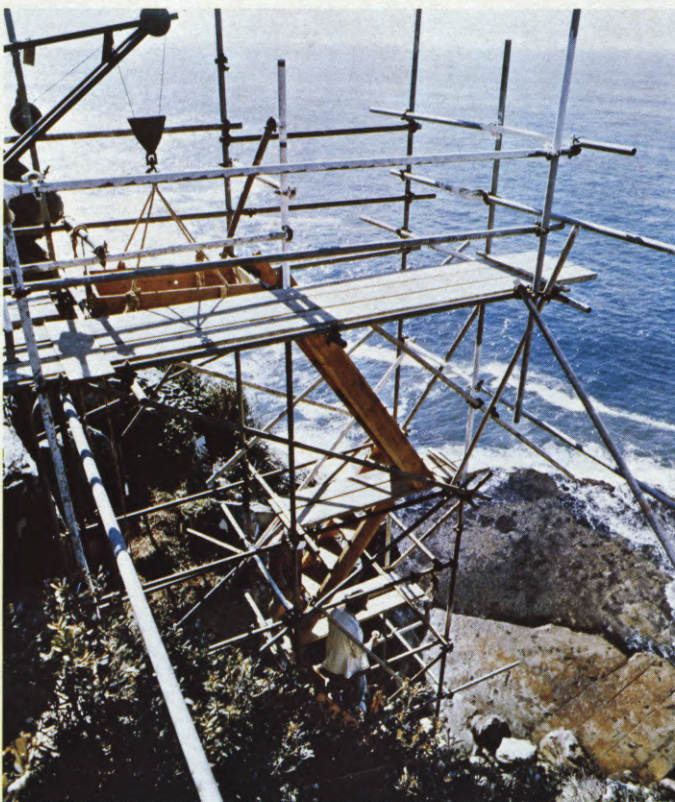
There is a tennis court in the garden on which was built a full scale, fully detailed set of the upstairs hallway which had to collapse on cue (with Richard Chamberlain doing his own "stunt work" in the thick of it) at the height of the storm.

This scene and others, where the spirit of the tribal elder revisited the home after a dinner party, had to be played without any light source other than the ambient moonlight, so I used half-blue gels over the lamps and bounced them off polystyrene sheets through doorways and underexposed two and two-third stops, which gave just enough detail and kept the cool unlit feeling.

There were several dusk exterior scenes outside the Burton home including scenes where Burton (Chamberlain) arrives home in the blinding rain. Naturally we scheduled the scenes right down to the last minute with set-up time for camera, a crane and tracking shot, and Special Effects supplying more rain than you have seen in a lifetime, to occur during the magic twenty-five minutes between sunset and darkness. Guess what? . . . we were absolutely ready to roll on take one about five precious minutes after the perfect time for light. We were using no artificial light at all except in the hallway and front door area. By the

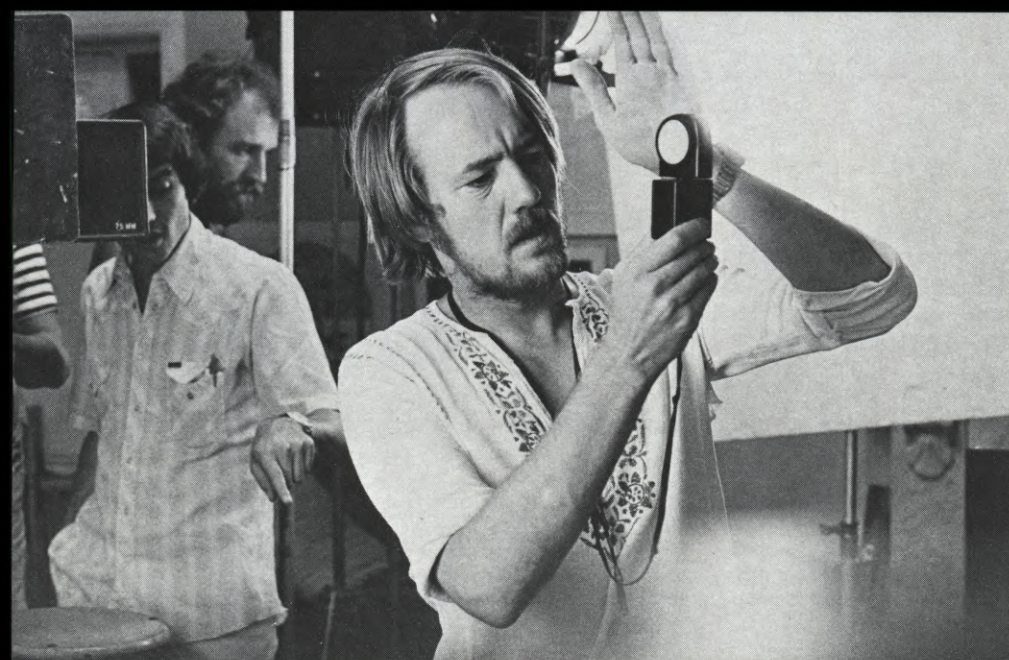


In a huge plastic tank, soon to be flooded, stand mockups of a store front and part of a bus which will be props for a surrealistic underwater scene in which the lead character experiences an apocalyptic vision of the city of Sydney after it has been inundated by a gigantic tidal wave. Elaborate special effects for this off-beat story have been executed with consummate skill.



(ABOVE) A 200-foot-high scaffold erected to provide access for personnel and equipment from the top of the cliff to the 50x50-foot entrance of cave location below. (BELOW) Young Sydney lawyer Burton (Chamberlain) climbs stairway of his home after arrival in a blinding rainstorm. Moments later, in a sequence of horrifying realism, the set is wrenched apart and caves in on him.





Versatile Director of Photography Russell Boyd takes a light reading with Spectra Candela meter. For "THE LAST WAVE" he adopted a photographic style of sharp, cold images, filmed entirely without fog, low contrast or diffusion filters. The effect is completely opposite to the soft, poetic, heavily diffused style of his previous effort, the lyrical "PICNIC AT HANGING ROCK".



(ABOVE) Students at a desert school scurry for cover, as torrential rain and hail pour down from a cloudless sky. (BELOW) The stunning storm sequence was created with the aid of fire hoses, wind machines and a crew of technicians dropping hailstones from the roof. The freak rainstorm is part of a buildup of weird events warning of a stupendous holocaust yet to come.



time we rolled on take three, which was the first usable and complete take, my Spectra was screaming out "go home".

We were still on the 20mm to 120mm Panazoom at that stage, as we had to tighten beyond the end of the track. I was prepared to allow the available light to be underexposed, by three stops, but beyond that level to change to a fixed focal length Superspeed lens. The Panazoom being T/3, but with the Panaflex shutter set at 200 degrees one can call it T/2.8 with a prayer, so our ambient light at that stage was reading T/1. For the remaining few takes until darkness fell, we used Superspeed lenses and I dried the Spectra off and put it to bed with the promise of no freak-outs tomorrow.

Between each take Tony Tegg and I raced around adding spun glass to each lamp in the hallway to keep the correct balance between exterior and interior light levels.

I pulled the 85 for these scenes, once again to keep the mood cold. On all interiors I used a Spectra Candela meter, working to a predetermined footcandle level, dictated by the depth of field required and found it a most accurate and consistent method of exposure.

I always built the key light up to full exposure and brought the fill up to between one-and-two thirds and two stops under the key level, which kept plenty of detail in the shadow areas.

Nowadays I use a Spectra Professional Series II meter and find it much faster and more convenient, particularly with reflected readings as a double check for brightness in the colour tonings of backgrounds.

A huge natural cave in one of Sydney's northern beach suburbs, on a sheer cliff facing the Pacific, was chosen for the cave and vault interiors.

A two-hundred-foot-high scaffold was erected to provide access for personnel and equipment from the top of the cliff and the fifty-by-fifty-foot entrance to the cave was blacked out to keep out unwanted daylight. Once again we were in a no-light-source situation, without even moonlight, so I underexposed even more and used a mixture of tungsten and half blue, mostly backlight, and a little smoke to separate the carved figures and relics of the tomb.

The Art Department built a dome within the cave which was the vault holding secrets of the earlier civilization. Burton (Chamberlain) discovers the paintings which tell the story and offer a warning of the holocaust about to happen.

Access to the cave in the story is only through a maze of tunnels and through the sewers underneath the city. Needless to say, as we used real locations, it was most uncomfortable.

Keeping the camera dry on rainy exteriors was a headache from start to finish. There were times when an underwater housing would have been handy and I can imagine how ridiculous the production stills would have looked with the housing mounted on top of the crane.

Mostly we surrounded the camera with plastic sheets, then covered John Seale and focus puller David Williamson with another larger plastic sheet. Again, most uncomfortable and difficult.

Seale came up with an effective idea to keep the lens dry, which involved blowing air down and away from the lens with a device mounted on the matte box. It kept all but the heaviest raindrops out. Not bad, considering that the Special Effects team led by Monte Feiguth and Robert Hilditch, two very precise Germans, poured thousands of gallons of water over us (with great glee, I might add) with the aid of the fire brigade's biggest equipment and tapping the city water supply as a backup. On hand we had two-by-eight-foot wind machines to stir the rain up. Where the camera was static in the rain, we set the camera up inside a tent and shot through a small opening in the door flap.

On late night shoots the tent became a drying out station with the occasional nip of brandy being administered to the waterlogged participants.

I used no gimmicks in the photography of "THE LAST WAVE". Apart from a little overexposure on the desert exteriors and underexposure mentioned before, there were a few occasions where I used a Polarizer and hard and soft-edge grads to darken skies.

We used the English Eastmancolor Negative (5247), as it proved with testing to be marginally lower in contrast, similar in grain and very slightly more pastel in colour rendition.

The laboratory, Atlab, and grader (timer) Jim Parsons must be congratulated for their consistency and high quality throughout.

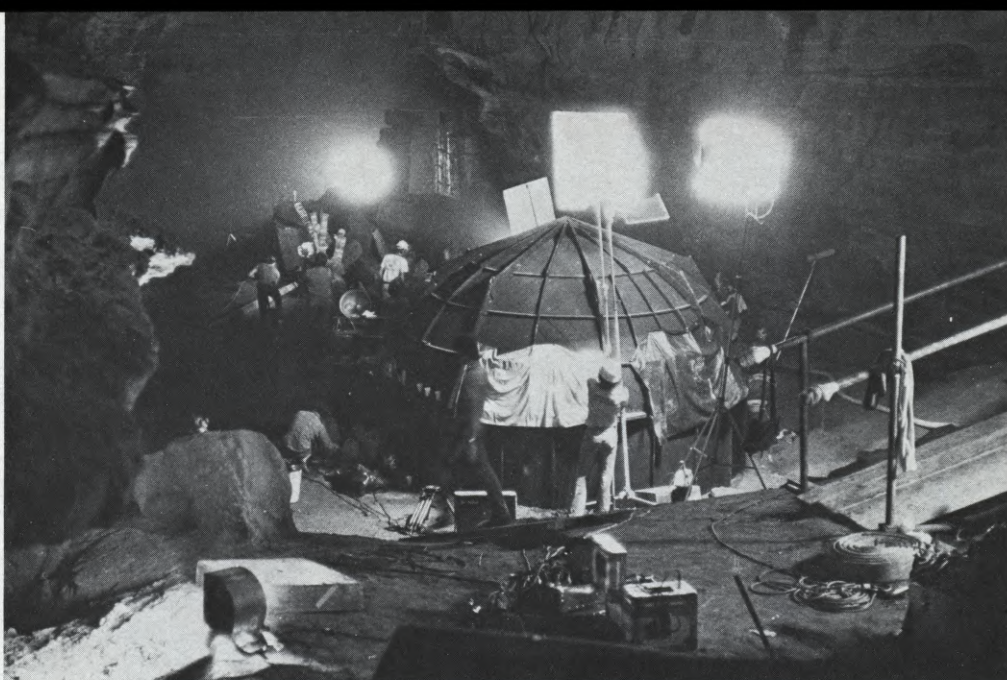
Both major laboratories in Sydney, Atlab and Colourfilm, produce work of the highest international standard.

I think "THE LAST WAVE" is Peter Weir's and Producers Hal and Jim McElroy's most ambitious production yet, and, in spite of our limited resources in Australia, the results speak for themselves. ■

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Filming inside a huge natural cave in one of Sydney's northern beach suburbs. In the foreground is the constructed dome set piece inside of which wall paintings warn of the coming disaster. In the background, the carved figures of an earlier civilization can be seen. Boyd used a combination of tungsten light and half-blue gel, plus a little smoke, to gain separation.



(ABOVE) For a dolly shot in driving artificial rain, the camera was swaddled in plastic sheets and an air jet device was employed to blow water drops from the lens. An underwater camera housing would have come in handy. (BELOW) Chamberlain plays a scene actually filmed in a tunnel of Sydney's sewer system—needless to say, a most unpleasant location site.



BEHIND THE CAMERA ON "JAWS 2"

Director of Photography Michael Butler discusses the frustrating problems, unusual challenges and innovative techniques involved in photographing the upcoming sequel to the highly successful "JAWS"

By SCOTT HENDERSON

The relentless terror engendered when a monstrous man-eating Great White Shark ravaged unsuspecting swimmers and attacked residents of a small East Coast beach resort community so enthralled movie audiences throughout the world that "JAWS" became (until "STAR WARS") the greatest box-office attraction in the history of motion pictures.

Hopefully, that same heart-stopping suspense and gripping adventure will be returning to the screen in that film's sequel, "JAWS 2".

And the same team that put together that erstwhile most successful motion

picture of all time, producers Richard D. Zanuck and David Brown in association with Universal Pictures, is again at the helm. With them also are many of the same people, both in front of and behind the camera, who contributed so greatly to the brilliance of "JAWS".

Jeannot Szwarc is directing "JAWS 2", a Zanuck/Brown Production which was written by Carl Gottlieb and Pulitzer Prize-winning playwright Howard Sackler.

Filmed entirely on location, "JAWS 2" began production June 6 on Martha's Vineyard island off the coast of Massachusetts. This was the same site pre-

viously used to depict the Long Island resort community of Amity, created by author Peter Benchley in his best-selling novel upon which "JAWS" was originally based. The island, largest in New England, lies just five miles south of Cape Cod and has a total land area of just under 100 square miles.

Following a month's shooting on Martha's Vineyard, the company moved to Navarre Beach, Florida, on the Gulf of Mexico about 25 miles east of Pensacola. The next four months were spent there filming some of the most exciting, dramatic and technically difficult boat

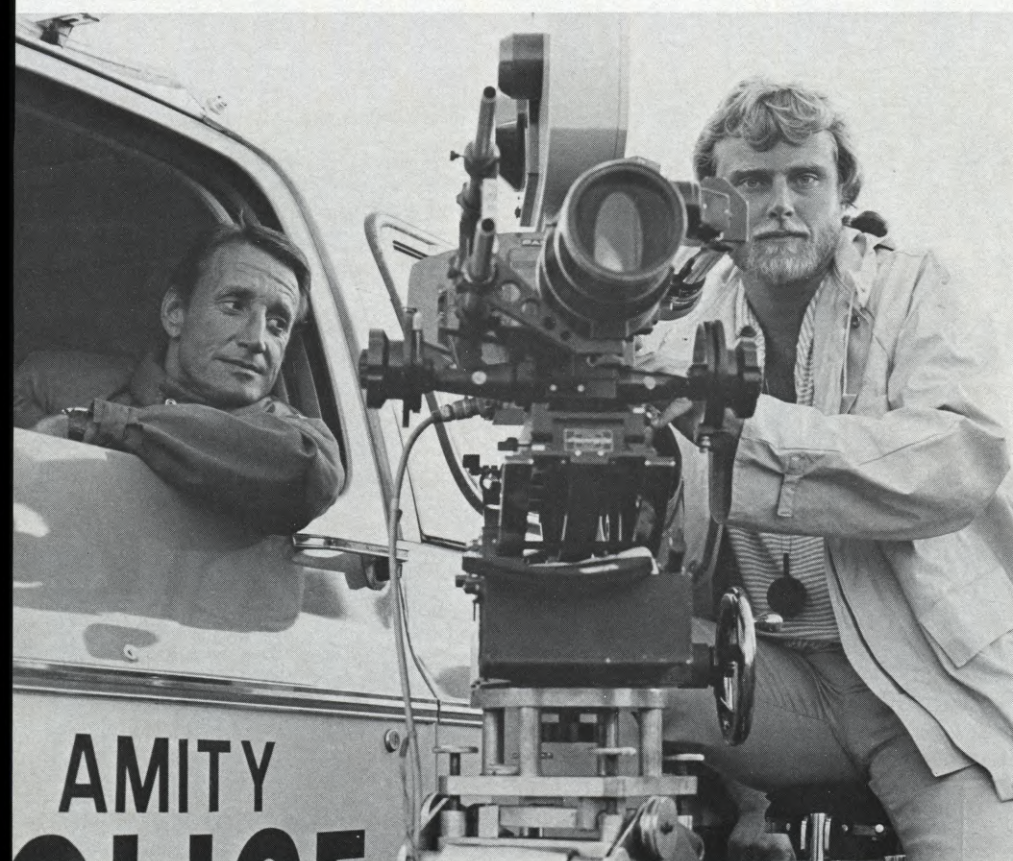
Continued overleaf



Shown on these pages are photographs taken during the filming of "JAWS 2", a Zanuck/Brown production for Universal release. The film, a sequel to the original "JAWS", which set all-time box-office records, was directed by Jeannot Szwarc. Filming began during midsummer in Martha's Vineyard, Massachusetts, location site of the previous ode to the Great White Shark, but production delays forced a move to a beach location 25 miles east of Pensacola, Florida, where shooting continued for several months. "JAWS 2" features Roy Scheider, continuing his original characterization, and a largely teenage cast.







Roy Scheider and Director of Photography Michael Butler on location at Navarre Beach, Florida, on the Gulf of Mexico about 25 miles east of Pensacola. Scheider reprises the role he played in the original "JAWS"; that of the conscientious police chief of the fictitious town of Amity, who is once again frustrated by greedy and cynical local politicians.

A scene is shot aboard a small boat using the hand-held Panaflex. Butler holds white Styrofoam sheet used as reflector, while director Jeannot Szwarc (wearing figured shorts) checks the action. Cramped quarters like these were par for the course during filming.



and shark attack action ever conceived or attempted.

"JAWS 2" is by far the biggest challenge faced by Jeannot Szwarc in his newly burgeoning motion picture directorial career. And, "It may well be my most challenging undertaking if I direct until I'm 100 years old!" Szwarc is quick to add. "It's an extremely complex film with technical hurdles and intricate details that are mind-boggling."

The production of "JAWS 2" is one of the most difficult and strenuous undertakings ever faced by any motion picture cast and crew. Because of the extensive shooting which took place at sea, it was a prior requirement that many in the crew, including cameramen, property men, grips and electricians, be licensed SCUBA drivers. And even diving skill was sometimes not enough to combat surging tides, high surf, thick fog and strong winds—the usual accompaniments to ocean-going photography.

Any weather obstacles that arose only compounded the difficulty of executing the immense number of special effects employed to sustain the film's excitement. Explosions; boats burning, capsizing and sinking; a shark attacking and being attacked—all comprised a hazardous challenge to special effects wizard Robert Matthey and his team of experts. But Matthey was well prepared for what he faced, having performed in the same capacity on "JAWS".

On Martha's Vineyard, cameras rolled at a variety of quaintly named spots. Although they all appear on screen as parts of Amity, scenes were shot in such parts of the island as Edgartown, Chappaquidick, Oak Bluffs, Menemsha, Gay Head, East Chop, Squibnocket, Vineyard Haven, Sengekontacket, Harthaven, Katama, Mattekeeset, Takemmy Trail, Chilmark, Pohognut and Mayhew Lane.

Director of Photography on "JAWS 2" is Michael Butler, whose recent credits as cinematographer include: "TELEFON", "MISSOURI BREAKS", "THE LOOTERS" and "92 IN THE SHADE", among others.

In the interview for *American Cinematographer* which follows, Butler talks about the problems and challenges, plus some unique new technology, involved in the production of this latest Great White Shark thriller:

QUESTION: Could you describe the basic photographic style you adopted for shooting "JAWS 2"?

BUTLER: We actually have had two different styles—mainly because we started the picture with one director, who
Continued on Page 366

THE "CEMENT MIXER" UNDERWATER RIG FOR FILMING "JAWS 2"

By GINO BARRAGY

Key Grip

A weird-looking vehicle designed to get the ultimate subjective effect—the point-of-view of a Great White Shark on the attack

In early discussions with Michael Butler we became convinced that we would need underwater subjective shots from the shark's point of view, and that the motion would have to be quite rapid through the water. We discussed various ways of doing it and, in the course of our investigations, found out that Jacques Cousteau had only been able to go five miles an hour using a diver underwater. We were advised that we probably wouldn't be able to do much better than that.

In the meantime, we had problems with the two hulls on the camera boat that we had built and we had to buy two new hulls, so I asked permission to repair the old hulls and use them to build a vehicle for underwater subjective filming. It was built during spare time by local welders in Pensacola, Florida and the machine work

was done at a place called The Green Machine.

The ring used to operate the module in the water is a gun turret from a World War II B-17 that Wes Thompson and I put together for a rolling shot in 1946. I remembered that we still had that, so I went to Universal and got it.

The next problem was figuring out a way to power the camera module so that it could be raised and lowered out of the water remotely to simulate the motion of the shark. We found out that using electricity—especially AC current—underwater was a bit dangerous, so we decided to operate all our controls below the water hydraulically—that is, with air.

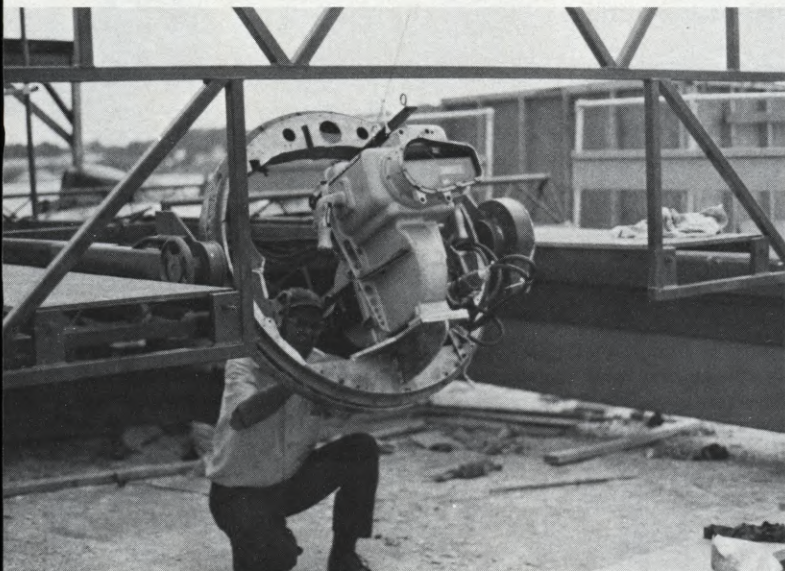
Our only other problem was that of buoyancy. We found that we had to add extra pods to the sides of the hulls in order to get sufficient buoyancy—which

slowed the vehicle down a bit. But even so, it's able to keep up with a water skier moving on the surface at 20 miles an hour. If we had been able to spend the money to get hulls that were a bit larger, we could have pushed it through the water properly at 35 to 40 miles an hour with no problem.

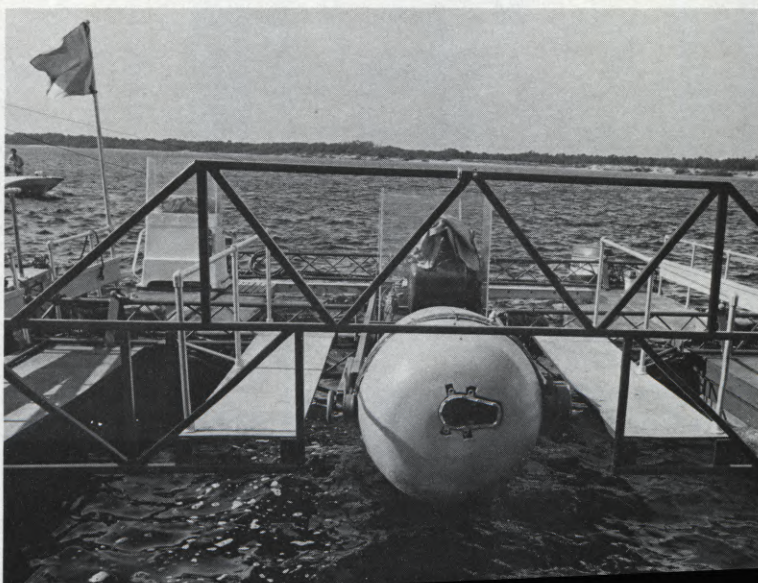
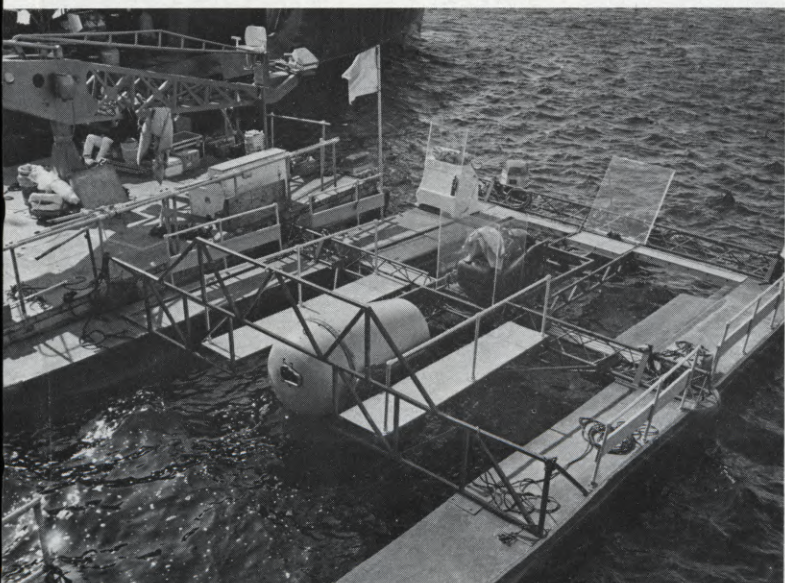
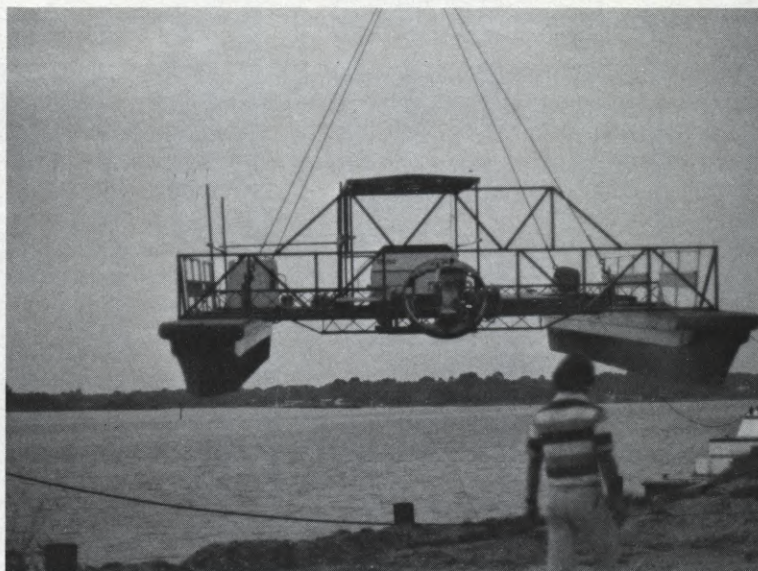
When we first hauled the rig out to the location, everybody wanted to know which end the cement came out of, because the shape of the module resembles that of a cement mixer. That name stuck, and we ended up calling it "the cement mixer".

We use a Panavision underwater camera with a 30mm lens that is mounted on a ring inside another ring that is locked securely. The inside ring is capable of rolling 360°, which would never be

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(LEFT) Built specially for "JAWS 2", the "cement mixer" module utilizes a gun turret from a World War II B-17 bomber. (RIGHT) Two discarded hulls from a camera boat were used to provide the catamaran-like floating base for the vehicle. (BELOW LEFT) The hydraulically powered module can be lowered 6½ feet into the water and rise two or three feet above the surface, running at 20 miles an hour. (RIGHT) The "cement mixer" gets its nickname from the shape of the module.



LENS DATA PROGRAMING WITH A HAND CALCULATOR

A boon to the cinematographer, either in the studio or on location, could be this hand calculator program to determine the hyperfocal distance, depth of field, horizontal lens angle and lens displacement

By ED SCOTT

The advent of the programable calculator puts a new tool in the hands of cameramen. Eventually cameramen will consider the programable calculator to be as necessary as the light meter. It is even probable that they will be combined into one unit. Using these new and reasonably inexpensive calculators makes it possible to handle complex formulas to determine accurate results for specific situations. A program can be written for any photographic function which can be expressed mathematically, including depth-of-field, exposure, lens displacement for close-ups and hyperfocal distance.

The following program will determine the hyperfocal distance, depth-of-field

(near and far), field of view (vertical and horizontal), horizontal angle of view and the lens displacement for any lens, at any f/stop, at any subject distance and for any camera format (16mm, 35mm, 65mm, video or any other format). It was written for Hewlett-Packard's programable calculators and will work on the following models; HP-29c, HP-19c, HP-67 and the HP-97 (though it is a desk model and wouldn't be as useful to a cameraman). While it is possible that a shorter version of this program could be written for the HP-25c, its usefulness would be very limited due to its much smaller program memory. Since the HP-29c (\$156 to \$195) doesn't cost very much more than the HP-25c (\$128 to

\$160), I would strongly recommend the HP-29c. Of course, if you can afford the HP-67 (\$360 to \$450) with its magnetic card reader and larger memory, you will find it even more useful.

I haven't included a version of this program for Texas Instrument's calculators (or for any other manufacturer's programable calculators), but I'm sure anyone who understands their particular calculator's programming system should be able to modify this program or write an entirely new one. I much prefer Hewlett-Packard's RPN system and find it difficult to work with other systems now that I am familiar with RPN.

Once you have chosen a calculator and read its instruction manual, you will be ready to begin using it. If you have bought a new calculator, be sure to plug it into a wall outlet via the power adapter (the batteries will probably be very weak and in need of charging on a new calculator). Turn the calculator on, switch it into programming mode, clear the program memory and carefully key in the program listed in TABLE 1 (if it is a Hewlett-Packard programable). Switch the calculator back to run mode when you finish.

You are now ready to initialize the calculator. Find the circle of confusion, aperture height and aperture width in TABLE 2 for the camera format you will be using. Store this data into the registers specified in TABLE 3 (i.e. R0, R8 and R9). Set the calculator for degrees and set the number of places past the decimal point at two (see TABLE 3). The calculator is now prepared for use. You can turn it off and the continuous memory will remember everything you have stored in it.

When you are ready to use the calculator, turn it on, key in the lens focal length (in millimeters) and press ENTER. Key in the f/stop and press ENTER. Key in the lens to subject distance (in feet and inches). All distances except lens focal length (millimeters) and lens displacement, circle of confusion and aperture (inches) will be keyed in and displayed in feet and inches. The feet will appear before the decimal point and the inches will follow it. When inches are between one and nine, a zero will follow the decimal point (i.e. 5.09 is five feet, nine inches and 11.10 is eleven feet, ten inches). Press GSB 1 and wait about ten seconds while the calculator runs the program.

When it finishes running the program the calculator will briefly pause to display

The author feels that eventually cameramen will consider the hand-held programable calculator to be as necessary a tool as the exposure meter, and that it is even possible that they will ultimately be combined into a single device. A program can be written for any photographic function which can be expressed mathematically.



Table 1, Lens data programing.

Line	Key Entry	Line	Key Entry
01	gLBL1	50	2
02	ST0.1	51	÷
03	gFRAC	52	RCL.3
04	ST-.1	53	÷
05	.	54	gTAN-1
06	1	55	2
07	2	56	x
08	÷	57	ST06
09	ST+.1	58	RCL7
10	1	59	RCL.3
11	2	60	gx ²
12	STx.1	61	x ÷ y
13	R↓	62	÷
14	R↓	63	ST07
15	ST0.2	64	RCL2
16	R↓	65	fPAUS
17	2	66	RCL3
18	5	67	gRTN
19	.	68	gLBL2
20	4	69	1
21	÷	70	2
22	ST0.3	71	÷
23	gx ²	72	ST0.5
24	RCL.2	73	gFRAC
25	÷	74	ST-.5
26	RCL0	75	.
27	÷	76	1
28	ST01	77	2
29	RCL.1	78	x
30	RCL.3	79	ST+.5
31	-	80	RCL.5
32	ST07	81	gRTN
33	ST0.4	82	gLBL3
34	CHS	83	RCL.1
35	GSB4	84	x
36	ST03	85	RCL.3
37	RCL.4	86	÷
38	GSB4	87	GSB2
39	ST02	88	gRTN
40	RCL8	89	gLBL4
41	GSB3	90	RCL1
42	ST04	91	+
43	RCL9	92	RCL1
44	GSB3	93	x ÷ y
45	ST05	94	÷
46	RCL1	95	RCL.1
47	GSB2	96	x
48	ST01	97	GSB2
49	RCL9	98	gRTN

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Table 2, Format data.

Format	R8	R9	R0
Super-8 safe----	.158"	-.209"	-.001"
Super-8 full----	.166"	-.224"	-.001"
16mm TV safe----	.248"	-.331"	-.001"
16mm safe-----	.284"	-.379"	-.001"
16mm full-----	.295"	-.404"	-.001"
Super 16/1.85---	.253"	-.468"	-.001"
Super 16/1.66---	.282"	-.468"	-.001"
Super 16 full---	.295"	-.488"	-.001"
35mm/1.85-----	.446"	-.825"	-.002"
35mm/1.66-----	.497"	-.825"	-.002"
35mm/1.33-----	.600"	-.825"	-.002"
35mm TV safe----	.535"	-.713"	-.002"
35mm full-----	.631"	-.868"	-.002"

Multiply aperture width by squeeze factor for anamorphic work (R9).

Table 3, Initialization.

Step	Instruction	Units	Keys
1.	Key in program.	-	-
2.	Initialize format; store aperture height store aperture width store circle of conf.	inch inch inch	ST0 8 ST0 9 ST0 0
3.	Set degrees.	-	g DEG
4.	Set decimal places.	-	f FIX 2
5.	Initialize shot; enter focal length enter f/stop key in distance.	mm. f ft.in	_____ _____ ____.
6.	Run program.	-	GSB 1

the near depth-of-field distance and then continuously display the far depth-of-field distance. Press RCL and then any one of the numbers 1 through 7 and the calculator will provide you with the following information:

RCL 1 — Hyperfocal distance — feet.inches.

RCL 2 — Depth-of-field — near — feet.inches.

RCL 3 — Depth-of-field — far — feet.inches.

RCL 4 — Field of view — height — feet.inches.

RCL 5 — Field of view — width — feet.inches.

RCL 6 — Horizontal angle of view — decimal degrees.

RCL 7 — Lens displacement — inches.

EXAMPLE:

Let us say you are shooting a scene in a 16mm industrial film which will be transferred to video cassette (see TABLE 2 for data to be stored in R8, R9, and R0). You want to be certain that the machine and the operator will be in focus. The machine is two feet, seven inches from your lens and the operator is four feet, one inch away. You are aware that you need to focus on a point about one-third of the distance from the machine to the operator, or three feet, one inch. You are using a 15mm lens and would like to shoot it at f/4.

SOLUTION:

1) Initialize the calculator for the format you are using—

Store the 16mm TV aperture height in R8—.248 ST0 8.

Store the 16mm TV aperture width in R9—.331 ST0 9.

Store the 16mm circle of confusion in R0—.001 ST0 0.

Key g, DEG, and f, FIX, 2 into the calculator—g DEG f FIX 2.

Once you have stored this data, you will not need to change it until you work in another film or video format.

2) Initialize the calculator for the shot you are working on—

Enter the lens focal length in mm.—15 ENTER. Enter the f/stop you want to use—4 ENTER. Key in the distance in feet and inches—3.01.

3) Run the program—

Key in GSB and 1—GSB 1.

After about ten seconds the calculator will briefly display the near and then continuously display the far depth-of-field distance. By recalling each of the storage registers one through seven, you will be provided with the following information:

RCL 1 — Hyperfocal distance — 7.03 — 7'3".

RCL 2 — Near depth-of-field — 2.02 — 2'2".

RCL 3 — Far depth-of-field — 5.04 — 5'4".

RCL 4 — Field of view — vertical — 1.04 — 1'4".

RCL 5 — Field of view — horizontal — 1.09 — 1'9".

RCL 6 — Horizontal angle — 31.31 — 31.31 degrees.

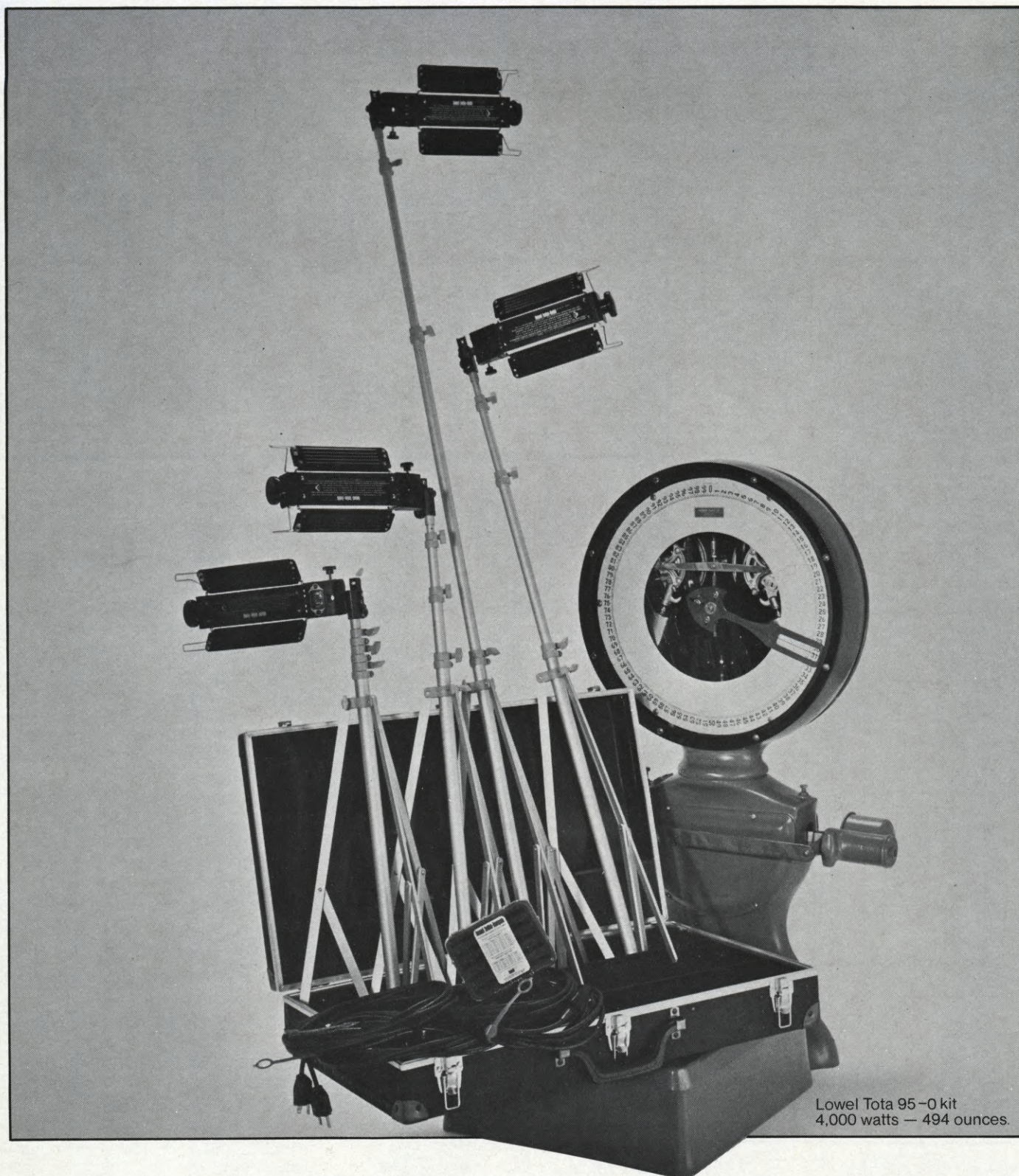
RCL 7 — Lens displacement — 0.01 — 1/100".

Since the machine at 2'7" and the operator at 4'1" fall well within the depth of field of 2'2" to 5'4" you are safe at f/4.

There are several special cases we need to cover. Occasionally when you press RCL 3 to find the far depth-of-field distance you will get a negative number.

This is no cause for alarm. It means that

Continued on Page 422

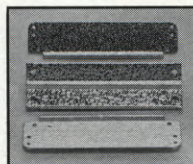
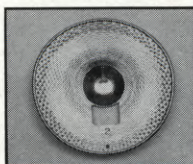


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AN AMERICAN FILM INSTITUTE SEMINAR WITH TED VOIGTLANDER, ASC

A sharing of experience with an Emmy Award-winning cinematographer who discusses techniques involved in filming a TV feature special

Asked to provide a resume of his professional career, Emmy Award-winning cinematographer Ted Voigtlander, ASC, submitted the following:

After graduation from the University of Washington, I traveled to Los Angeles to make my way in the world as a bacteriologist. With no money, medical school was out, so I turned to music—working a few clubs, playing guitar, piano and trumpet. I loved music, but the future in that direction was not too bright. Since I could type, I took a job at MGM Studios as a typist in the Script Department. It didn't cost MGM much to experiment with me—the salary: \$18.37 a week.

Three months later I was shifted over to the Publicity Department and, from that "gofer" position, was assigned to assist Laszlo Willinger in his portrait studio on the lot. It was there that my thoughts zeroed in on what I wanted to do. The job gave me a chance to observe, both in his studio and on the sets. The function of the Director of Photography became a mental challenge to me.

A few months later, there came an opening in the Camera Department as an equipment clerk. I applied for it and was accepted. This gave me a chance to learn the basics.

In 1943 I was made an assistant cameraman and went right smack onto the set, assisting Karl Freund, ASC. The picture: "A GUY NAMED JOE", starring Spencer Tracy, Irene Dunne and Van Johnson. Karl was a very strict, but kind man. He held my hand firmly, but gently, and gave me a wonderful indoctrination into the field of cinematography.

I must say here that I had the great advantage of having assisted and operated for such cinematography "greats" as Robert Surtees, Joseph Ruttenberg and George Folsey while at MGM. To them I can never say "thank you" enough.

When MGM finally bowed to television production, I was camera operator for Nick Musuraca on a series called "THE ISLANDERS". There were four segments left to do when Nick suffered a heart attack. Jaime DeValle, the producer, asked me to finish the season and I accepted. Stepping into the shoes of a fine cinematographer was quite a challenge. (Fortunately, Nick recovered, but went into semi-retirement, and I was able to have him do some second unit work for me later.)

The series was dropped and so was I. MGM reduced production almost to a standstill and the future looked pretty bleak. Howard Koch was organizing a company to do the pilot film for "BEN CASEY" and was interviewing cinematographers. Les Baker, of Eastman Kodak, mentioned my name to Ted Winchester, who headed the Desilu Camera Department at that time. He had seen a projection room screening of the last segment of "THE ISLANDER" and I assume he was impressed. Ted spoke to Koch about me and I was called in for an interview. With no real "track record", I felt a bit inferior to some of those I knew were also being interviewed. I got the job—which really started me on my career as a cinematographer. To date, that career has taken me through more than 500 one-hour or longer television series segments, features and specials—and it is at this point that I would again like to thank my teachers.

My credits include: "THE ISLANDERS", "BEN CASEY" (Emmy nomination), "WILD, WILD WEST" (Emmy nomination), "COWBOY IN AFRICA" (Emmy nomination), "BONANZA" (Emmy nomination), "LITTLE HOUSE ON THE PRAIRIE" (Emmy nomination), "AMELIA EARHART", "IT'S GOOD TO BE ALIVE" (Emmy and "Cinematographer of the Year" Awards), "COLUMBO", "MASK OF ALEXANDER" (to be released by MGM), "STONE" (to be released in June), and "THE LONELIEST RUNNER" (Emmy nomination).

What follows are excerpts from the seminar with Ted Voigtlander, ASC, held for the Fellows of the American Film Institute (West). The seminar, moderated by James Powers, of the A.F.I. staff, was preceded by a screening of "IT'S GOOD TO BE ALIVE", on which Mr. Voigtlander served as Director of Photography.

JAMES POWERS: Let me introduce to you Ted Voigtlander, ASC, who was the cinematographer on the picture you just saw ("IT'S GOOD TO BE ALIVE", CBS Television). Among other things, he will be talking to you about the problems of projecting a film made for television in theatrical release.

VOIGTLANDER: As you all noticed during this screening, I myself kept raising the top frame line and pushing the bottom line down because it was shown

here in 1.85. Prior to its going on the air, they had a showing at the Doheny Plaza Theater and they ran it in 1.85 there, so I went through my calisthenics again. When we shot the film, we were made aware of the fact that it could be released in 1.85, so we tried to hit a happy medium in framing. But it was made primarily as a special for television.

QUESTION: When you know a film is going to be released both theatrically and for television, how do you compensate?

VOIGTLANDER: You don't do anything. On your ground glass in your viewing system, the operator has both a 1.85 area line and a TV safe area line inscribed, and he tries to hit a happy compromise between the two. It's not fun. However, knowing for sure that it's going to be released on TV, you tend to lean that way. The operator would go out of his mind if he saw it on a theater screen with the 1.33 TV aspect ratio—too much headroom—and so would I.

QUESTION: Was the picture we just saw shot in the studio or on practical location sets?

VOIGTLANDER: Except for the hospital room sequence, which we shot on the Fox lot because director Michael Landon wanted to make a long pullback to show Christ in the bed—a symbolic shot we could not have made in an actual hospital—everything we did was on practical sets. That one sequence was the only thing we shot in the studio.

QUESTION: Did you have lighting problems when shooting in the practical sets?

VOIGTLANDER: Yes, there are always such problems, especially on low shots where you have a ceiling involved. We make such shots in the studio all the time, but where you can't move a wall, you've got the problem of hiding the lighting and trying to make it work with single light source effects. You fake a little top light from something, somewhere and hide it so that you have a little separation between the characters and the wall.

QUESTION: When you shot on those practical locations, did you build grids of some kind to light them, or did

you use light stands?

VOIGTLANDER: There's a piece of equipment called a "spreader" that has vacuum cups on each end with a spring that forces them out. This gives you something to hang lamps on, but you have to be careful not to ruin a ceiling or wall with too much pressure. I had such an experience while shooting a picture for MGM in an old Spanish house in Arizona. The boys started putting a spreader up and forcing it, and pretty soon the old stucco wall started to go. So you do have those problems, but usually spreaders work out fairly well if you don't try to put up a lot of lighting—which means that sometimes you're stuck with low-key.

QUESTION: Did you sometimes have problems with white walls in those practical sets?

VOIGTLANDER: Yes. You try, when you can, to scrim with nets. Using anything like fill lights would give you 9,000 shadows. You're lucky if you can use Juniors and a scrim. There's no way you can paint walls on practical sets, unless the lady says, "Well, I don't mind having a

beige wall."

QUESTION: Photographing a black person against a white wall presents quite a problem, doesn't it?

VOIGTLANDER: Yes. it does. Fortunately, both Paul Winfield and Lou Gossett perspire. If you can get actors who perspire, you luck out. (Laughter) Then your kickers, cross lights and everything else show up. When the actors are very cool, calm and collected, you've had it. I don't know if you're acquainted with a half-MT filter—it's a little like an 85—but I've sometimes taken that and put it on an inky-dink with a snoot and hit them with that. I use that with a black person quite a bit and it helps bring out the modeling of the features.

QUESTION: What about balancing interior and exterior light when shooting in practical locations?

VOIGTLANDER: Let's take a scene from this picture that was shot in a room in Pasadena—the scene where Lou Gossett is pitching baseball with the kids and he's inside looking out. The window

has an 85 plus an N3 (neutral density grey) filter on it to halfway balance with the outside. Yet you can never really balance it, because your color temperature outside never matches that of your incandescent light inside; it just doesn't. If you're shooting such a scene at 3:00 in the afternoon, your exterior light is as yellow as all get out, and that's supposed to match your interior light; but it never works out, unless you go through a lot of color filter control. You don't have time to do that in filming for television. On a picture like "BARRY LYNDON" they take two years and if they don't like an effect, they go out and shoot it again.

QUESTION: In the film we just saw, did you do a lot of hand-held work?

VOIGTLANDER: Yes, Michael Landon liked it, so it was done at the director's request. I don't necessarily like it myself, but you go with the director, and I can't help but speak very highly of this young man. He's very bright.

QUESTION: Why did he decide to do it hand-held?

VOIGTLANDER: For example, in the scene where they're taking him down the hospital corridor to the elevator, the director wanted to keep the newsreel effect going—as if there was a newsreel cameraman shooting. That was what he had in the back of his mind. He didn't want it to be a steady dolly shot. He wanted it to have a more documentary feel.

QUESTION: For that closeup shot of the fly on his face, did you use diopters?

VOIGTLANDER: Yes, that shot was done with a half-diopter on the 250mm end of a zoom lens. It was kind of hairy to do. The fly was put inside a plastic box with an air vent in it and an optical glass in front. Everything else was plastic so that we could shoot light through it. The camera was about a foot away from his face.

QUESTION: Did you have to wait a long time to get the fly to land in the right place?

VOIGTLANDER: A man came to us who said he was a fly wrangler. (Laughter) He said, "I've got three flies." We said, "Well, crazy; you go ahead and try it." They weren't trained flies, but with teeny-weensy drops of molasses put in the right places, they landed where we wanted them. That's how it worked.

Continued on Page 386



1974
"It's Good to Be Alive"
(G.E. Theatres)

Ted Voigtlander
A.S.C.

PHOTOGRAPHING "JAWS 2"

Continued from Page 358

had a certain approach, and then switched to another who, of course, worked in a different way. What we've ended up with is a style that tries to convey as real and natural a feeling as possible. We tried to make all the land and interior sequences as warm and appealing as we could—and that included the water sequences that did not show the shark. We wanted to keep the general atmosphere romantic and pleasurable, rather than stark and scary, so that the contrast of the shark's menace versus the scenery would be tremendous. Basically, that was the photographic style of the picture, but in trying to achieve it we came up against enormous technical problems.

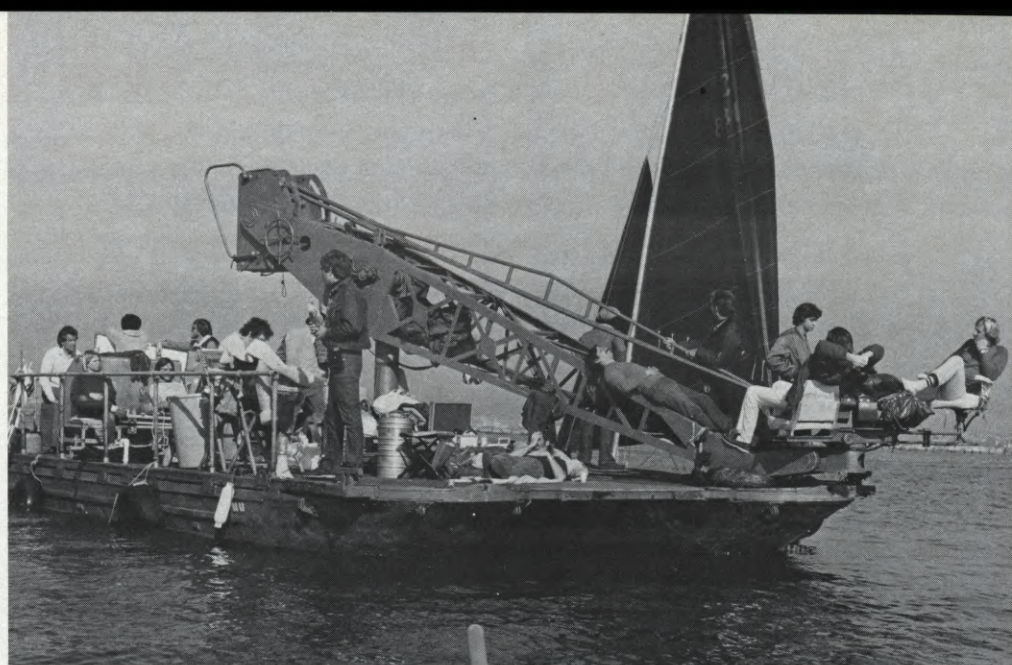
QUESTION: Do you mind going into detail about those problems?

BUTLER: I think the biggest problem was working with the full-scale shark, which I believe, except for King Kong, was the largest mechanical monster ever put together. They tried to build it better, more functional and with a greater threat of danger than the one they created for the first "JAWS" picture. I truly believe they accomplished that, but working with mechanical special effects on such a grand scale sometimes becomes rather trying. Added to that was the problem of working on water in ever-changing weather conditions, while trying to maintain visual continuity.

QUESTION: The weather matching problem which you mentioned is frequently, of course, a major challenge on location. How did you go about coping with it?

BUTLER: Well, at first the only answer

that we all seemed to feel was the right one was to wait for the conditions to match themselves. In working around various different seas, I've found that the water condition itself changes about every 20 minutes in terms of chop and sky character. The sea, of course, reflects the color of the sky—so if it's a cloudy day, the sea looks gray; if there's a blue sky, it looks blue. But all of that means that you have to take careful note of what your conditions are when you start a sequence. We were fortunate, in that particular area during the summer, to have scattered clouds much of the time. We would try to establish the basic visual character of a sequence by means of a master shot, keep track of that on paper, and then try to match the cut-in shots as the particular condition returned. However, since we were shooting totally out of continuity, it took an awful lot of paperwork to recall what it was we did six months before on a par-



Working off the big (60-foot-long) camera boat, which carried a large crane topped by the Tyler Gyro Platform, an ingenious electronic stabilizing device that compensates for any angular movement of the ocean to keep the camera it supports level and steady.



(ABOVE RIGHT) Necessity is the mother of invention. Lacking a Chapman crane for a high shot, the crew mounts the camera atop a step ladder. (BELOW LEFT) Co-producers Richard Zanuck and David Brown, who produced the phenomenally successful original "JAWS", take a break on the Florida location. (RIGHT) A large sign publicizes the presence of the company on location, while attempting to discourage the locals from entering the shooting area.



ticular shot. I must give credit to the producers at Universal for allowing me to take the time to match elements, so that I didn't have to shoot visibly out of continuity.

QUESTION: Didn't it get pretty expensive—having to wait to match weather conditions?

BUTLER: Yes, there were times during the filming of action sequences with the shark when there was no way you could wait, because of the expense involved. With production costs running \$125,000 each day, you can't wait long. But for the most part, it was a matter of waiting and being proficient at understanding the water conditions and knowing how much you could get away with and how much you couldn't.

QUESTION: From reading the script, I would say that there are a good many more boats to cope with in this picture than there were in the first "JAWS". Isn't that so?

BUTLER: Yes. In the first picture there was mainly the "Orca", which was a power boat. But in this picture about 90% of the water action involved multiple sailboats, which means that you had little control, because the wind is in control of a sailboat. These were big sailboats—catamarans—and there were eight or ten different styles. To make things even trickier, these boats were being sailed by teen-age actors and we had to teach them how to sail. Shooting dialogue sequences of them while they were sailing the boats posed some problems and we really had to do some thinking to find ways of solving them.

QUESTION: And how did you solve them?

BUTLER: We decided that we would have to build a camera platform that would be self-propelled and would move through the water to keep up with fairly fast action—something that would give us the ability to do types of shots that had never been done before. Most water scenes in pictures are shot either from a stationary mount on shore, or from a boat—with the camera on a tripod or hand-held. When shooting from a boat there is invariably the problem of a wildly pitching horizon line whenever the boat rolls even slightly. In the past, gimbals have been used to solve the problem, but with only partial success. The first camera platform we built was a catamaran-type structure on pontoons 31 feet long. It was propelled by two



In a classic gesture, cinematographer Butler uses his "ten-fingered viewfinder" to line up a scene. Of the "JAWS 2" shoot, which continued for more than ten months, he says: "Thinking back over all the pictures I've seen, I can't imagine a more difficult project or one that presented more problems."

Evinrude 200 horsepower engines which enabled it to move quite rapidly through the water. We put a Nike crane on it, with a Tyler Gyro Platform to lock the camera steady to the horizon.

QUESTION: How did the combination work out?

BUTLER: We found, soon after we began using it out on the ocean, where we had so much roll rather than chop, that the boat was not sufficiently large to house my camera crew, the sound crew, all of the electrical equipment, and what have you. So we went ahead and built another model that was 60 feet long and held a larger crane—and it functioned quite well in the ocean. In fact, I can't imagine trying to do a picture like this without it in the water.

Continued on Page 378



(ABOVE RIGHT) Assistant cameraman cheerfully slates scene, while treading water. (BELOW LEFT) Operator John Fleckenstine buckles on body harness in preparation for aquatic bucking bronco ride. (RIGHT) Astride the mechanical shark, he prepares to photograph a moving "over-the-fin" shot.

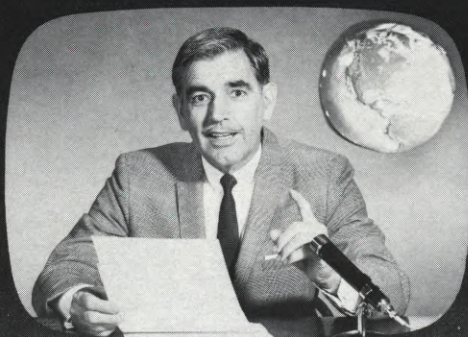


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MAKING A SUPER-8 DOCUMENTARY...THE HARD WAY

Assigned to make a 20-minute documentary on an almost non-existent budget, this determined filmmaker found that Super-8 was the answer

By JACK M. SELL

A sudden hush descended on the auditorium as an expectant audience watched the dignified gentleman mount the stage. He beamed benignly down at them and said, "As President of Albany Junior College, I am delighted to welcome you this evening to the premiere of an important motion picture entitled 'ALBANY JUNIOR COLLEGE, A NEW BEGINNING'. This is indeed a most exciting event . . ."

The rest of his introduction was brief. And I guess he said all the right things. But after the good professor's affable greeting, not much got through to me. I was too nervous, and my mind was still struggling with the realization that had been nagging me during the past hectic weeks: *There must be a better way to make a twenty-minute Super-8 sound film.*

I had been attending Albany Junior College for almost two years. Everything about it was great—except that I was enrolled there on a film scholarship, but the curriculum offered no film courses. And now, perhaps to compensate for this discrepancy, I had been requested to produce a twenty-minute promotional documentary that would present the virtues of AJC to groups of high school graduates—hence the title, "... A NEW BEGINNING." And so it was for me too.

BRIEF, HAPPY IGNORANCE

When Jim Saville, the Audio-Visual

Instead of declining the "impossible" assignment, Jack Sell took it on, learned many harsh lessons, but produced an award-winning 20-minute color/sound documentary.

Director of the college, first approached me with the idea, I thought it would be a great challenge. "Just give me an Arri BL, 10,000 feet of 16mm ECO, and a three-person crew," I blithely responded and immediately started to compile a production budget. But when I submitted it—after much paperwork and numerous phone calls to labs and camera stores—I was informed that my estimate (which was in the thousands) must be cut to a mere \$200. Jim worriedly asked me what could be done with that paltry sum. What did I reply? I don't remember. I was still in shock.

When I revived, I decided to face my options, I could attempt the production on its original grand scale and hope for a miracle when the money ran out. Or I could cut everything to the bone, shoot with Super-8 film stock, forget about the crew, and write a shooting script that would be carefully planned to avoid wasting film footage. In practical terms there was hardly a shadow of a choice, if I wanted to support my scholarship and make like a real live film producer.

BUMPY TAKEOFF

The college came through with a camera—a Super-8 Bolex 155 Macro-Zoom. Okay! But there was no double system film editing equipment in the audio-visual department for making a synchronized sound track—so all picture editing would have to be done with a viewer. Oh, well . . . And the sound track must be timed to the film while running it through the projector and then transferred to a magnetic stripe applied to the edge of the film. This, above everything else I had to consider, implied extreme simplicity in the shooting script.

During the next few weeks I worked closely with the College Public Relations Director, Mary Ellen Bacon, to develop a treatment and rough script that would give us a feasible documentary approach which was still within the limits of our meager resources. We reminded ourselves that too many documentaries recruit narrators to babble pages of factual material. And we established the fact that our audience—students just graduating from high school—wouldn't go for it. Facts, easily found in the curriculum catalog, could put them to sleep in five minutes. After all, the film's objective was to motivate, not expound.

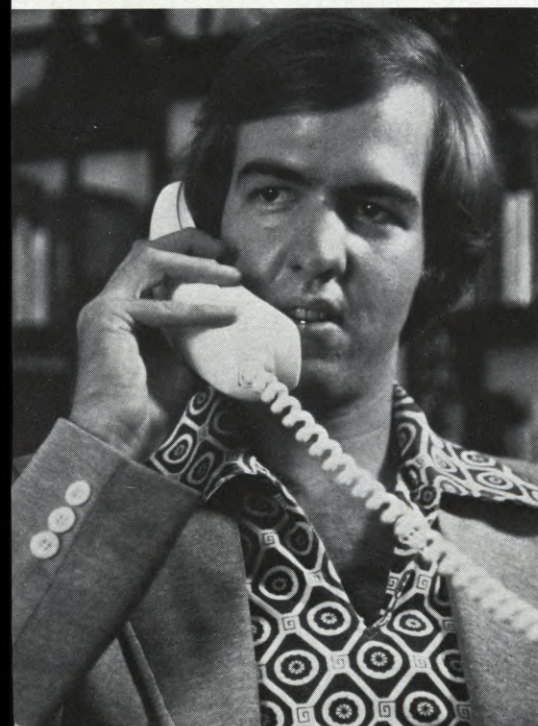
LIGHTS! CAMERA! ACTION . . . AND THE SOUND OF MUSIC

The documentary opens with an aerial view of AJC's impressive campus, made from the local radio station's helicopter and accompanied on the sound track by a long tympani roll. This sound effect introduces a carefully arranged musical treatment for each sequence. From this point on, the action and mood in all major sections of the film are correlated with distinctive segments of background music.

Because the music department of AJC is large and includes a symphony orchestra, a chorus, a concert band, dixieland, country western, and stage bands, I decided to record each musical unit so that I could combine and blend them in various effects. The result was an almost original score of music. Each group performed beautifully and added a definite feeling of continuity to the entire production.

By way of further humanizing the *new beginning* theme of the film and encouraging viewer identification, I introduced a young girl—a likeable high school type—who is beginning to contemplate her future. Should she, or should she not, attend college? Standing alone in a soft sylvan background, she articulates her thoughts in a quiet monologue. "*Graduation always seemed so far away until a few weeks ago. . . now it's just come and gone, and there are only a few memories—football games, parties, Mrs. Clark's grammar tests. . . I guess I'll have to start thinking about the future. . . and college. I don't really know what college is all about. Or if I really need to go. . . But on the other hand, I've been told that college is important. . . maybe so. . .*"

After this drama bit, the audience is given a complete visual tour of the campus. Slow, pulsating music rendered by the symphony orchestra reflects an academic mood, as students are observed in the science laboratories, delivering talks in a tense speech class, and listening to an instructor in a lecture hall. Then bars of electronic music introduce the business department with its computers, typewriters and other business machines. Next, a woodwind quintet provides a precise rendering of tones to emphasize the detailed work being performed by dental and nursing students. A brass choir plays dignified, impressive chords as the camera, mounted on a wheelchair, trucks through seemingly endless book stacks. The strains of a



classic piano concerto follow the viewer through the art and ceramic classes. A jazzed-up dixieland band begins the lively footage of a comic football game, with players colliding and fumbling the ball. These scenes were shot on black and white film stock (Plus-X Reversal 7276) complete with sound effects and speeded-up action (6 fps). Dissolving back to color stock I shot the action of swimmers, golfers, weight lifters, tennis players in slow motion and accompanied this segment with symphonic music to suggest the concentration and strength needed for these athletic activities. The teachers of AJC provided a change of pace when they made their movie debut in the "communications" section of the film. Accompanied by the chorus singing an arrangement of "You've Got a Friend", the students and faculty play and fraternize for the camera.

So far, the whole project had gone quite smoothly. No problems with focus and lighting to actually overstrain my technical knowledge, no lack of cooperation on the part of staff and students. The climax of the activities section of the film was the college's annual club day. This involved more outdoor activities, which I shot with the camera hand-held to capture the fast-moving action of egg races, water balloon throws, a wheelbarrow race. The country-western band contributed some foot-stomping rhythms to accent the high tempo of these scenes.

Everything looked good to me and I relaxed a bit, soothed by the knowledge that my shooting script was nearing its end. All that remained was to get some typical shots of the social scene at AJC and this, I optimistically told myself, would be a pleasant way to spend an evening. Rock concerts and school dances were ideal visuals for displaying the college's entertainment programs. The most appealing effects would come from the pulsating rock beat accompanying the gyrating patterns of twisting bodies. I could visualize it all in my mind's eye. But does over-confidence always invite disaster?

The locale for the "Grass Roots" concert I had decided to use for this area of the movie was the college gymnasium. And, as you might expect for this kind of occasion, the lighting had been kept to a minimum. No problem! I simply flooded the stage with several 1000-watt quartz lights. The effect was brilliant—and shattering to my plan and my ego. The huge crowd began booing and stomping. They let me know in no uncertain terms that rock under that high-voltage glare was a desecration, and the uproar seemed to upset the performance of the band. The lights had to be turned off. And I faded



An aerial view of ALBANY JUNIOR COLLEGE, which required a 20-minute promotional documentary film which would present the virtues of the institution to high school graduates. Incredibly, the college had only \$200. to allot to such an ambitious project, but the film actually got made in color and sound, with an "almost original" score, proving that Super-8 is often the only way to do the cinematic impossible.

away humiliated, without one foot of film.

Later while reviewing my disaster, I recalled a scene from "BUTCH CASSIDY AND THE SUNDANCE KID", in which the filmmakers used still pictures to portray a long crosscountry journey. When the next concert came, I was ready with a new idea and determined not to blow it. This time I used only a Minolta 35MM camera and some high-speed black and white film. With this simplified approach I managed to take many still photographs, which were blown up to 5x7" matte finish prints and placed on a copy stand equipped with colored lights. Then, using the Bolex camera with its macro-zoom lense, I was able to focus down to within a few inches from the photos. By flashing the lights and panning and tilting the camera I created the effect of a magical kind of movement. The screaming crowd and the driving rock music made this segment one of the most effective, memorable sequences in the entire production. And I regained my professional self-respect.

The finale of the movie brings back our thoughtful high school girl and her introspective monologue. As she leaves the campus, she states her conclusions: "*It seems funny now that I ever thought college was unimportant. The world . . . well, the world looks different to me. I think I understand more. College is the real beginning of learning, and now I know where I'm going and what my plans are for the future. You know, it's a great feeling to have this beginning.*"

The camera slowly zooms back to an aerial shot of the Albany Junior College campus with credits that follow.

HOW TO SPELL DISASTER . . . "LAB"

I recall hearing one of my college professors say, "A lab that offers cheap prices will inevitably give you cheap service." In other words, you get what you pay for. I learned the truth of his statement—the hard way, of course.

After buying and processing some twenty rolls of film (shooting ratio of 3:1), I had a grand total of seventy-five dollars left in my budget. I decided that the ideal way to spend this little sum would be to order some dissolves, fades, and supered titles from one of the many film laboratories that specialize in Super-8 film.

I had seen in a trade magazine the advertisement of a laboratory on the West Coast which specialized in optical effects for 8mm film. The ad said that if you needed a dissolve you simply sent them the two strips of film you wanted to use and specified the length of the effect. The lab would set up the "A & B" rolls, print and return a duplicated piece of film containing the two scenes joined by a dissolve. This footage could then be cut into the original film. For "supered" titles the same procedure was followed, and for a fade, of course, only one piece of film was needed.

Choosing this particular lab was one of the worst decisions of my film career, for the only thing this California lab specializes in is stealing money from the unsuspecting filmmaker. After waiting a long five weeks for delivery and impatiently anticipating some beautiful footage, I was absolutely shocked when it finally arrived and was run through the projector. It took only a few minutes to make me realize that I had paid over fifty dollars for 38 seconds of film that looked as

Continued on Page 418



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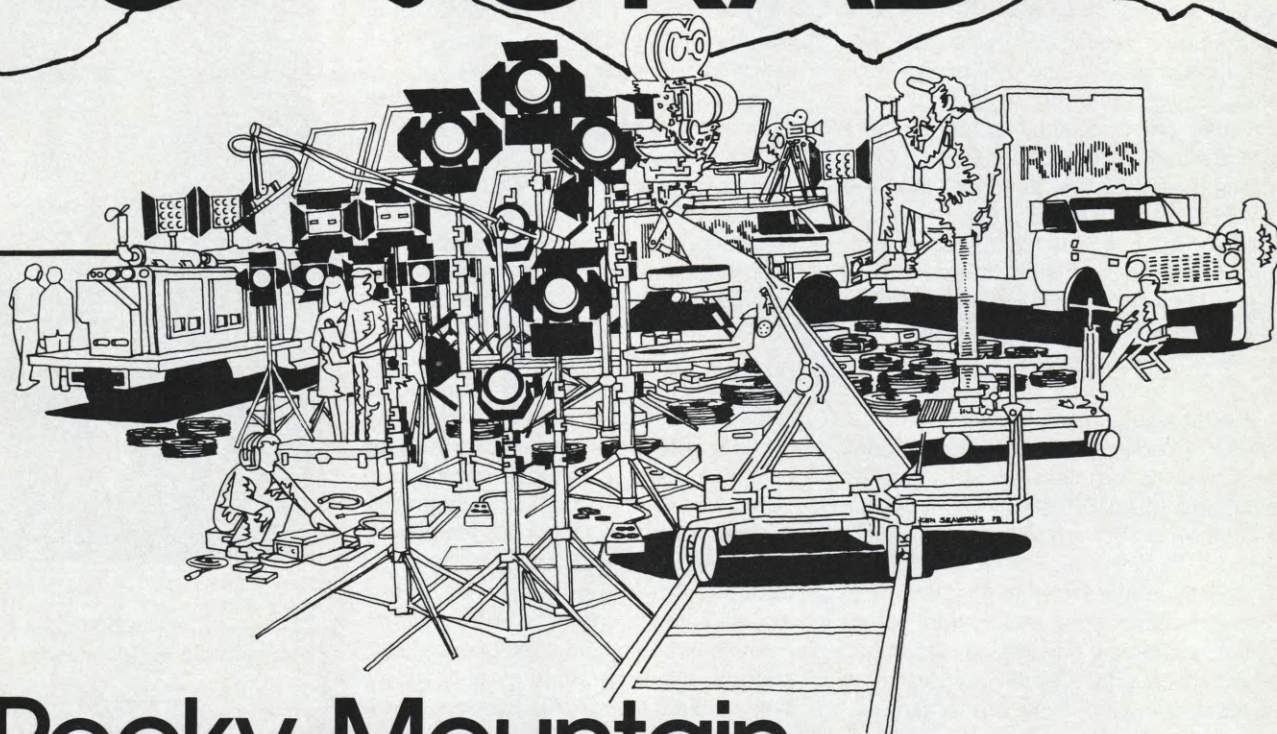
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FILM STILL A STRONG MEDIUM, SAYS KODAK AT SEMINAR

Twenty five years ago it was first predicted that videotape would soon take over as the preferred production and display medium, but today film is still more than holding its own

The first trade press headlines predicting the demise of motion picture film as a production and display medium appeared in the late 1950s. Videotape technology was in its early days, and some were predicting that this new medium would soon obsolete film. Two decades later both tape and film are alive and well and serving the diverse needs of the motion picture and television industries.

A day-long trade seminar for members of the motion picture and television trade press hosted by the Motion Picture and Audiovisual Markets Division (MP&AVMD) of Eastman Kodak Company recently provided interesting insights into film's continuing strength. The seminar, conducted in Rochester, also provided some glimpses into the future of the film medium.

Kodak executives participating in the meeting included Ken Mason, Kodak assistant vice-president and general manager of MP&AVMD; Ray Troutner, manager, sales operations; Bill Koch, director, sales development; and Hart Sweeney, manager, marketing planning and administration, and Hugh Roger-Smith, manager, advertising, promotion and publications. Also taking part in the discussions were Tony Bruno, director,

sales development, entertainment and television broadcast markets and Dick Schafer, product programs and research.

Despite the tide of publicity about ENG and other electronic production, 1977 was the best year Eastman Kodak Company has had in terms of overall color footage produced by the entertainment film industry, Mason revealed.

Last fall, between 75 and 80 percent of all prime-time programs were originated on film. While that was only a modest gain compared to the past four or five years in terms of percentage of programs originated on film, Mason pointed out that stiffening competition between the networks has put much more stress on quality.

"I'm speaking about both content and image quality," he said. "Advancements in film technology have made it easier for producers to work under more realistic conditions. And while more film was produced for the same number of programs, the associated costs were often lower because of the availability of a faster color negative film and advances in lighting, equipment, cameras and lenses."

The sharpening competition also led to changes in programming philosophy. This resulted in more flexible scheduling



Ken Mason, Kodak assistant vice president and general manager of MP&AVMD was among the participants in the recent seminar held in Rochester.

Kodak Park, located in Rochester, N.Y., is Kodak's largest photographic film, paper and chemical manufacturing complex. It is situated on some 2,000 acres and stretches for more than seven miles. The building in the left foreground with the "Kodak Park" sign atop it houses the motion picture film finishing operation.

and the production of more mini-series, specials and syndicated programs. While these have often replaced regularly scheduled programs on network schedules, there hasn't been a reduction in the number of original episodes. The trend has been towards more production and fewer reruns, Mason noted.

At the same time, the number of movies made for television remains consistent at around 100 a year. Mason added that some growth in movie production for TV can be expected. Feedback from producers indicates that it would not be unrealistic to expect to see as many as 120 films made for television in 1978.

The theatrical film industry also enjoyed a banner year in 1977, Mason continued. More theatrical films were produced than at any time in recent years, and such big box office winners as "STAR WARS" are providing the fuel and incentive for 1978 and following years. "The fact is that theatrical film distributors are clamoring for more features," he said.

How about the broadcasting news in-



dustry, where ENG has clearly made a substantial impact? "Despite the popular acceptance of ENG, 16mm color reversal film sales to news, documentary and commercial producers were only slightly under the previous all-time high," Mason answered. Furthermore, sales of 16mm color negative film to documentary and magazine program producers and commercial-makers more than made up for the difference.

In general, Kodak spokesmen sounded genuinely confident and enthusiastic about the future of film as a news gathering medium. Koch pointed out that only 525 of the 979 television stations in the country currently have news programs. Of these, 480 stations use film for news, and 413 of these stations handle their own color processing. Koch also estimated there are around 1,000 ENG cameras in use at some 375 stations. "We feel there is a lot of room for growth in expanded news coverage at the stations already having a film capability, as well as at the smaller stations that haven't yet entered the field," he said.

One reason is that the cost of buying, operating and maintaining ENG equipment has proven to be much higher than many stations anticipated. ENG has a clear advantage when live coverage is needed, but Koch estimated that only one in 20 stories is covered live by stations having that capability. "I don't think the promotion of live coverage has made any significant impact on anyone's ratings," he noted, "so we are now pretty much seeing it restricted to valid news."

ENG also has an advantage in immediacy for late-breaking news since it can be transmitted and doesn't need to be processed. "Most stations can now process color reversal film in 15 minutes or less," Koch said. "We presented a paper at the 1977 SMPTE winter TV conference on a process that could shorten this to less than eight minutes, but found little interest in the industry."

While ENG is providing a capability for getting late-breaking news on the air, film is being used more for features, documentaries and in situations where mobility is very important.

Why, then, the gap between what is actually happening in the broadcasting news industry and the prevailing climate of opinion represented in much of the trade press? "In addition to the numbers of manufacturers promoting ENG, electronic production has a semantic advantage in that it is almost always written of and spoken about as being the newer medium," Koch replied. "The implication is that progressive research and development is being done in electronic technology while film is standing pat. Most of the projections about film and ENG aren't



During the day-long trade seminar sponsored by Kodak for members of the motion picture and television trade press, participants had the opportunity to visit the Kodak Photographic Technology Division, located in this handsome building, where they saw work being done to improve the quality of tape-to-film transfers.

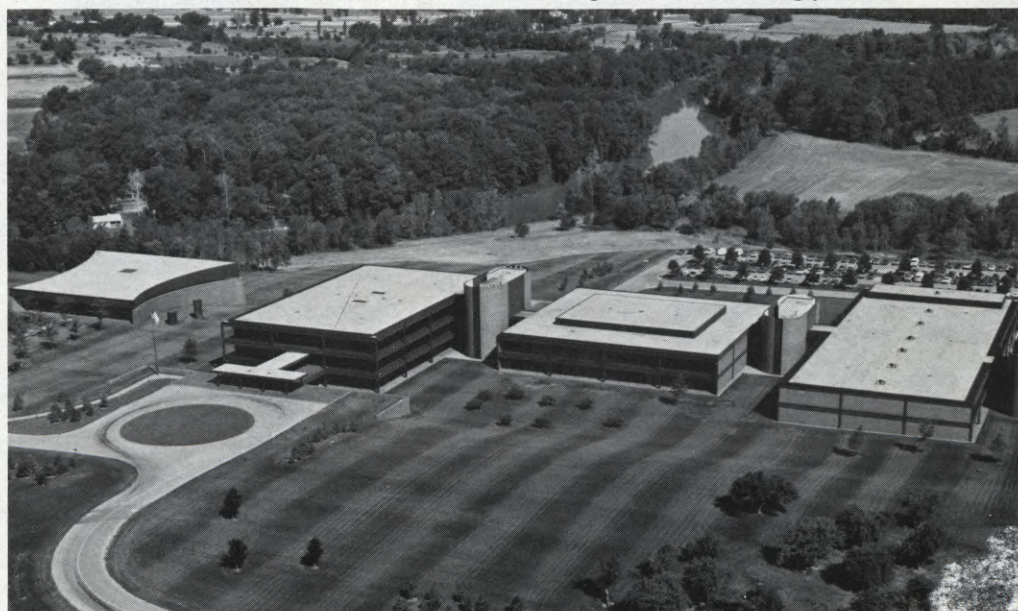
based upon today's state of the art, but on unfulfilled promises. I think we have to wait and see how broadcasting news changes and how ENG and film technologies develop before we can arrive at any conclusions about their relative roles."

Other spokesmen addressed the same issue. Sweeney pointed out that when the first headlines trumpeting the

arrival of videotape appeared, film didn't hold a very strong position in television. There were comparatively few local news programs, and they used either 35mm slides or 16mm black-and-white film when they used visuals at all. As for the entertainment side, much production was done live, and the filmed shows were all black-and-white. The idea of

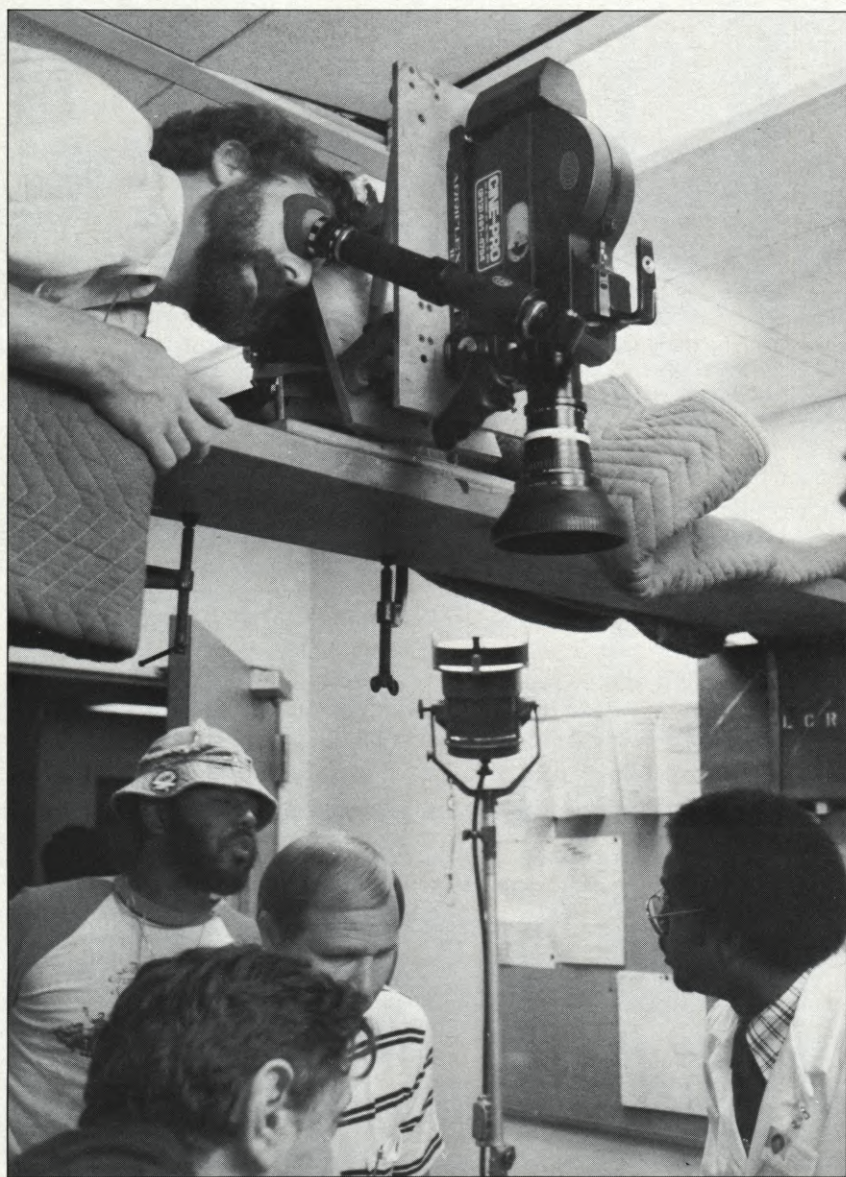
Continued on Page 410

Located in Henrietta, N.Y., a Rochester suburb, the Kodak Marketing Education Center is designed to train customers, dealers and company sales and technical personnel. From right to left, the four-building complex includes a three-level laboratory building, three-level seminar building, four-level administration building and a tiered dining pavilion.



Arri 16SR on location in tight quarters: flexible unobtrusive and fast.

"Producers like quality," says Jack Cooperman,
"But most of them like speed even more.
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to get good production quality fast."



"10mm focal length on this one," says Mr. Cooperman.
"I had to keep my body up high, out of the shot. The
camera's small size, light weight and adaptable finder
let me rig the whole thing with *one* plank, and get right
up against the ceiling. A fast setup, and *compact*."

Until he shot this segment of a
March of Dimes documentary Special, Jack Cooperman had never
used an Arri 16SR. Here are some of
his comments:

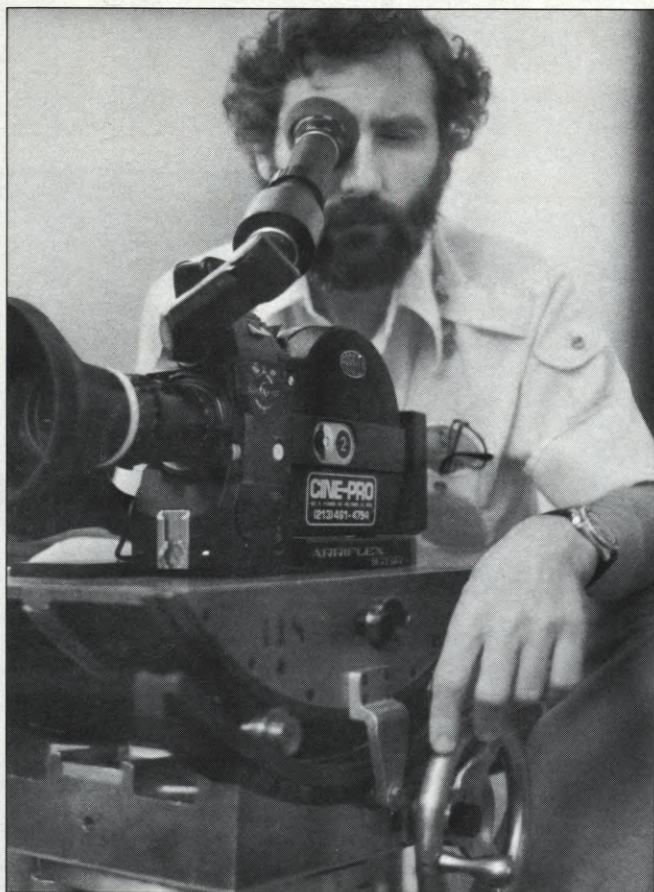
"We were shooting medical staff
and patients at a hospital. To catch
the action while it was spontaneous,
and to keep out of everyone's way,
we had to be fast and flexible."

"I found it *pleasurable* to work
with that camera," says Mr. Cooperman.
"It's a studio-quality tool; and
it does everything you expect, plus
quite a few *new* things."

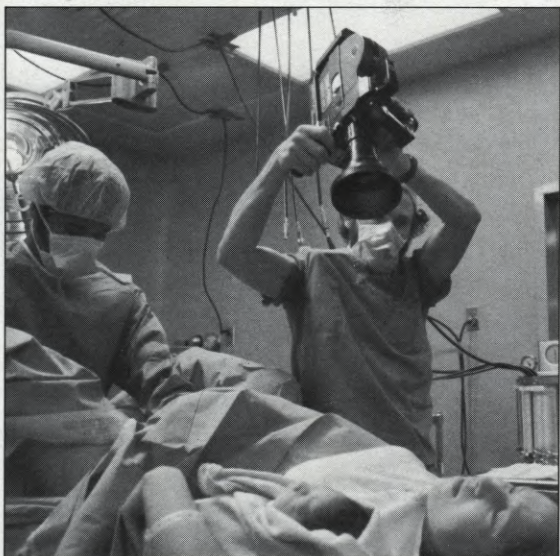
Produced by March of Dimes Foundation; Ed
Franck, Director; Jack Cooperman, Director of
Photography; Jack Green, Camera Operator.

"Shooting in the crowded Oper-
ating Room, we had to keep out
of everyone's way. No tripods."





"For one move, I needed to start next to the wall," says Mr. Cooperman. "With the SR's amazing viewfinder, I could put the Worrall head *against* the wall, and still see what I was doing without mashing *my* head."



"The birth sequence required unobtrusive shooting. The cable-free battery on the camera's back helped a lot."

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"What was important to me about this camera was the ability to keep the creative flow going at a *steady pace*. The fast setups and reloads were ideal for unscripted, spontaneous action."

"I'd lock it off, swing the finder over for the Director, swing it back, and we'd roll. *Instantly*."

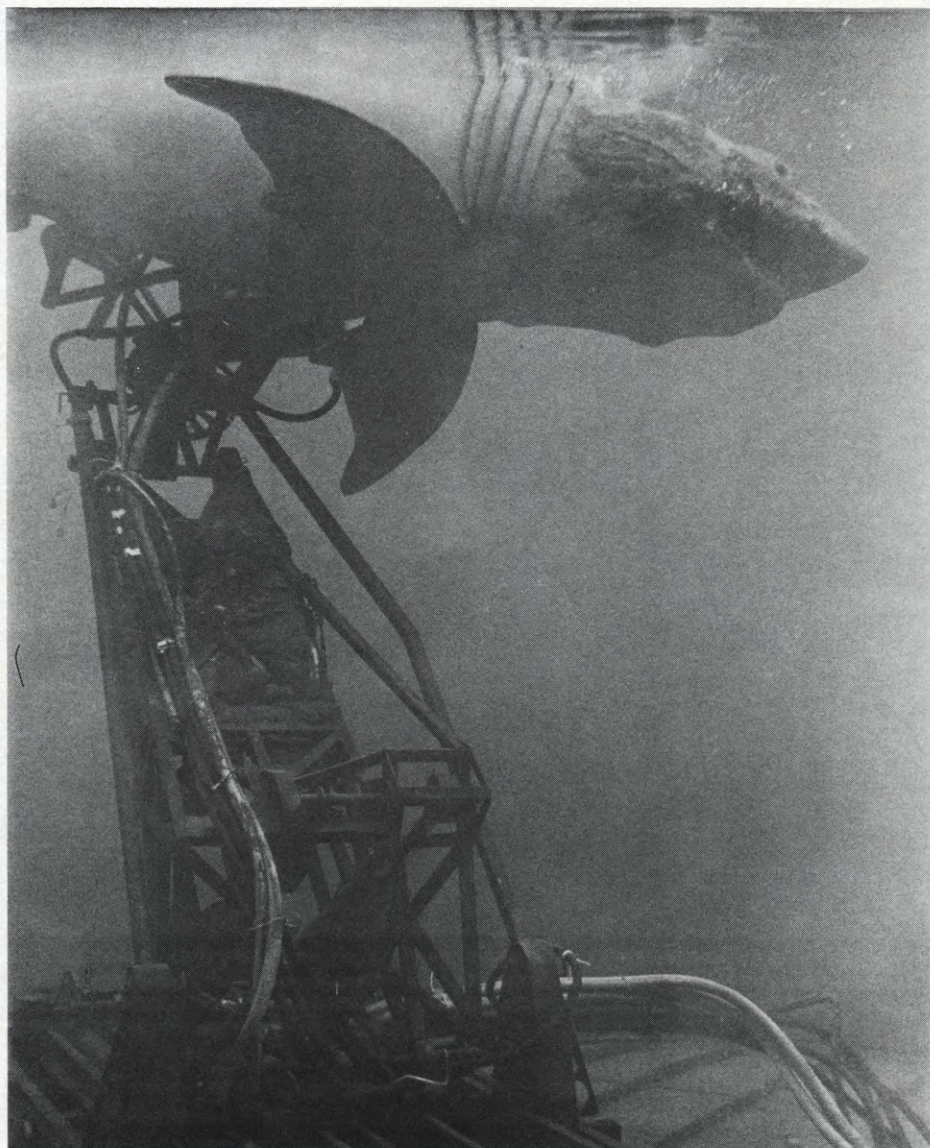


QUESTION: Was the second model just like the first in design, only longer?

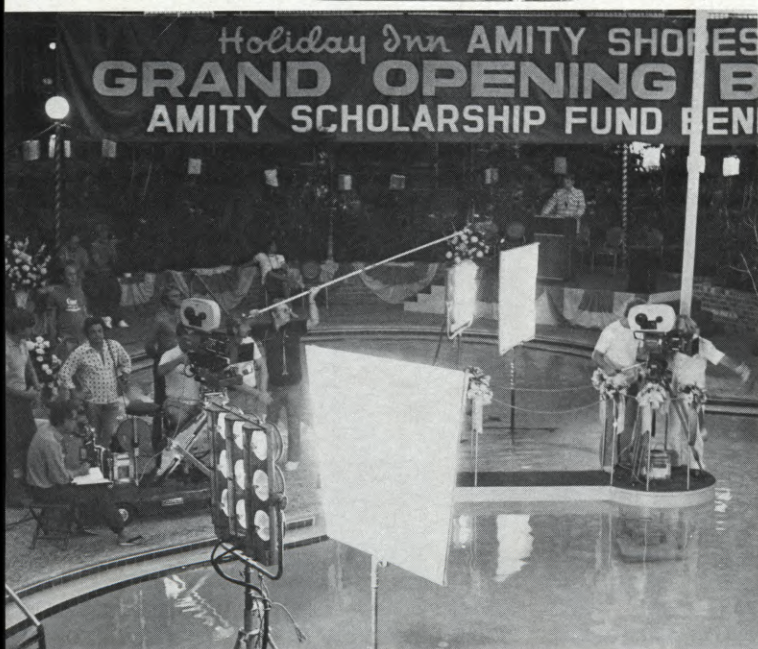
BUTLER: No, the 60-foot model was not a catamaran design, although it did have a double hull. We bought two steel hulls from two sort of Navy transport boats and had them filled with liquid Styrofoam for added buoyancy and then built a platform on top.

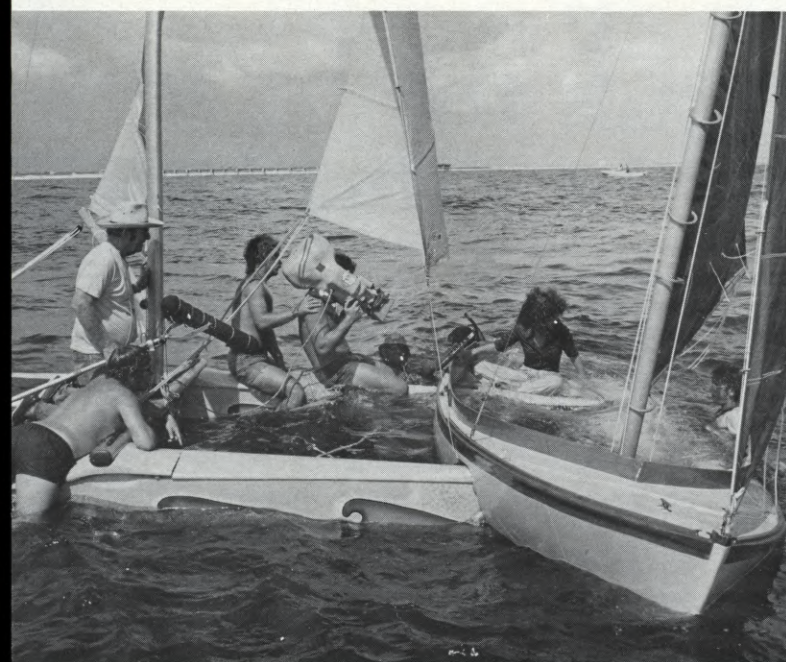
QUESTION: For the enlightenment of *American Cinematographer* readers, would you please describe the Tyler Gyro Platform in greater detail?

BUTLER: Sure. The device (which proved invaluable to us) was first used, I believe, in filming "ISLANDS IN THE STREAM" and later during the shooting of "KING KONG" and "ORCA". By instantly compensating for any angular movement the ocean can make, it keeps the camera it supports level and steady. This is done through a combination of the latest technology in gyros, electronics, hydraulics and structural engineering and it can be employed in a boat of almost any size. In other words, it doesn't necessarily require the costly raft-type barge which we found essential for other reasons. It is compact (22" in diameter and 12" high), water-resistant and weighs 65 lbs. The Tyler Gyro Platform is powered by a separate unit consisting of



(ABOVE RIGHT) Evil presence of "JAWS 2", the mechanical Great White Shark floats atop the intricate metal arm that supports it and carries its controls. The supporting platform, located on the sea bottom, weighed 40 tons—the shark itself, five tons. (BELOW LEFT) Shooting around the pool of the Holiday Inn at Navarre Beach for the opening sequence of the picture. (RIGHT) A small crane is pressed into service for shooting in the Holiday Inn lobby.





(LEFT) Operator and soundman on a raft shoot one of the scenes that takes place after the shark attack. (RIGHT) Camera operator and assistant work off boom arm of Nike crane aboard the small camera boat, with second camera crew in background. Thirty-one feet long and powered by two Evenrude 200-horsepower engines, this catamaran-type boat proved to be too small to carry requisite crew and equipment. It was later replaced by a new boat 60 feet long.

an oil tank, hydraulic pump and electric motor. It can be mounted to a tripod, fastened to the deck, or even put on a crane (the way we used it). It can be attached to a tripod or hi-hat with one 3" diameter wing nut. You then attach a standard pan-tilt camera head to the stabilized top portion of the platform and mount your camera on top of the pan-tilt head. The device is turned on by a single switch and its functions are so fully automatic that you soon forget that you're even using it.

QUESTION: And what precisely is the effect on the screen?

BUTLER: It keeps the camera level within 1/10th of one degree. The operator simply pans or tilts the camera head, which is above the Gyro Platform and is, therefore, unaffected by the ship's pitch or roll. The effect on the screen—to answer your question—is that the wildly teeter-tottering horizon and shore line are brought to a constant level, with only a hint of gentle movement.

QUESTION: What about the "cement mixer" underwater filming rig that you used on this picture?

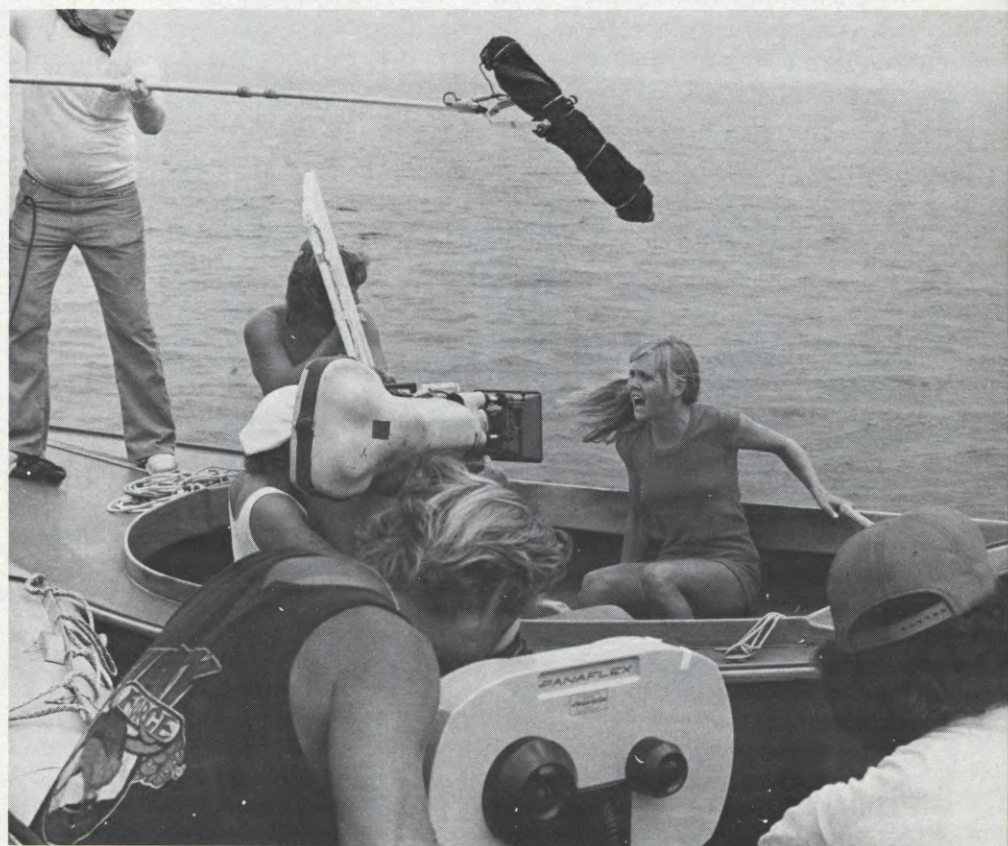
BUTLER: Well, necessity was the mother of that invention. It evolved from two basic limitations of the mechanical shark. First, it moved too slowly in the water to build up the kind of excitement we needed. Second, it provided no means of getting subjective shots from the shark's point of view as it races

through the water and comes up out of the water. The platform that the mechanical shark sat on top of weighed 40 tons total, including the shark—which weighed five tons itself. The platform was approximately 30 yards long and 15 yards wide. It had in the middle a railroad

track with a dolly on top, and rising out of that dolly was what I would call an "erector set" type of arm. The shark was designed to swim in a 360° circle and submerge at all different angles. It does fantastic things, but in a very animated type

Continued on Page 382

In two-camera setup, operator in background hand-holds Panavision-modified Arriflex to shoot closeup of girl in boat, while Michael Butler's brother, David, operates the Panaflex in the foreground. Multiple cameras saved time on location and aided in editorial matching.



OXBERRY puts the Masters touch into the Filmmaker

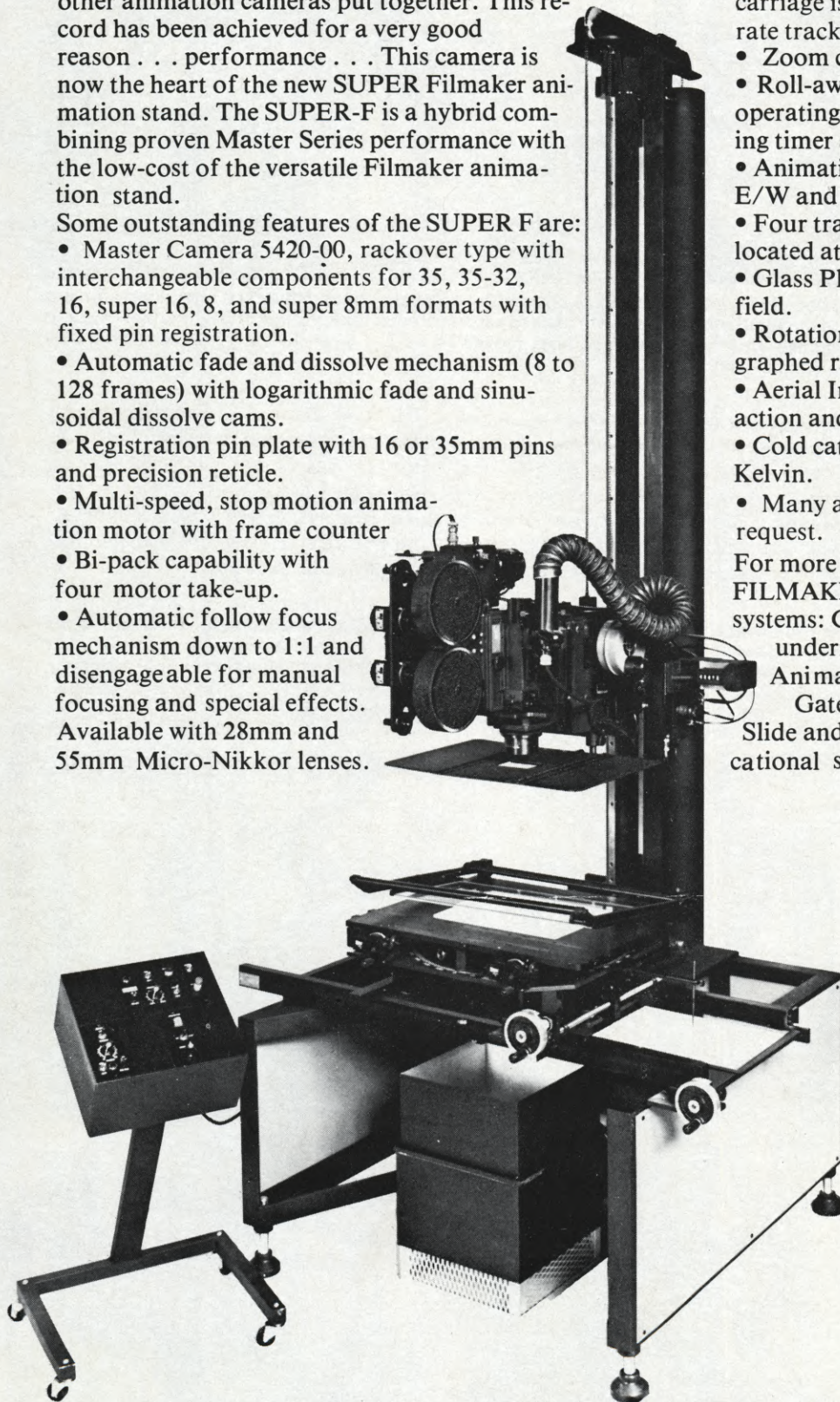
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PHOTOGRAPHING "JAWS 2" Continued from Page 379

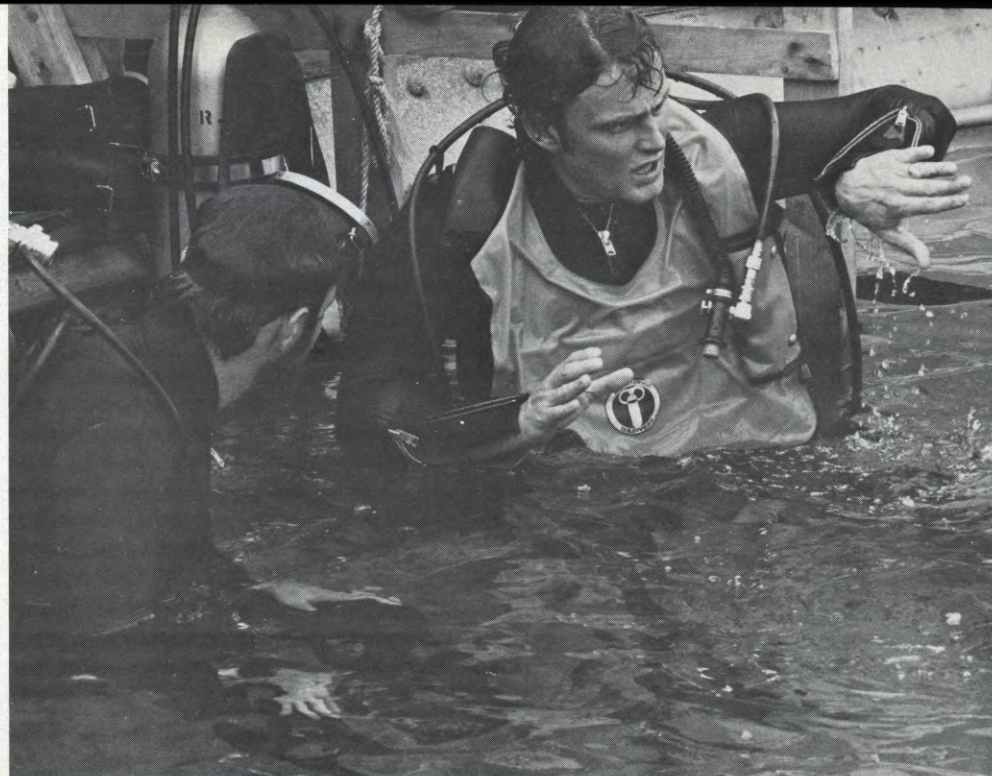
of way. The main problem, as I said before, was that it moved too slowly, and this created editorial problems.

QUESTION: And that's why you designed the "cement mixer"?

BUTLER: Yes, because a big shark in the midst of an attack moves very fast, not slow. At first we thought we might be able to speed up the action by using a zoom lens underwater, but the Panavision anamorphic camera we were using is a single lens camera, with no provision for a zoom. We then thought of mounting a zoom on a lighter camera, like an Arriflex or Mitchell Mark II. I talked to other cameramen who had used such equipment, but who, in the end, had never been able to get the kind of shots we wanted. The fact is that a zoom lens, used underwater, is like shooting through a magnifying glass, so it wouldn't have done us a lot of good. So the Production Designer, Joe Alves, and I and my key grip, Gino Barragy, sat down, discussed the problem and came up with the concept for an underwater camera vehicle that could be towed by a boat. It had to be quite an elaborate structure in order to house an underwater camera as big as the one we were using, plus the operator.

QUESTION: Why do you call it the "cement mixer"?

BUTLER: Because the housing looks



Wearing wet suit and SCUBA gear, Michael Butler gives instructions to crew while shooting underwater scenes in Florida of the shark attacking a downed helicopter. Of the experience, he comments: "Working constantly on water is demoralizing, totally demoralizing."

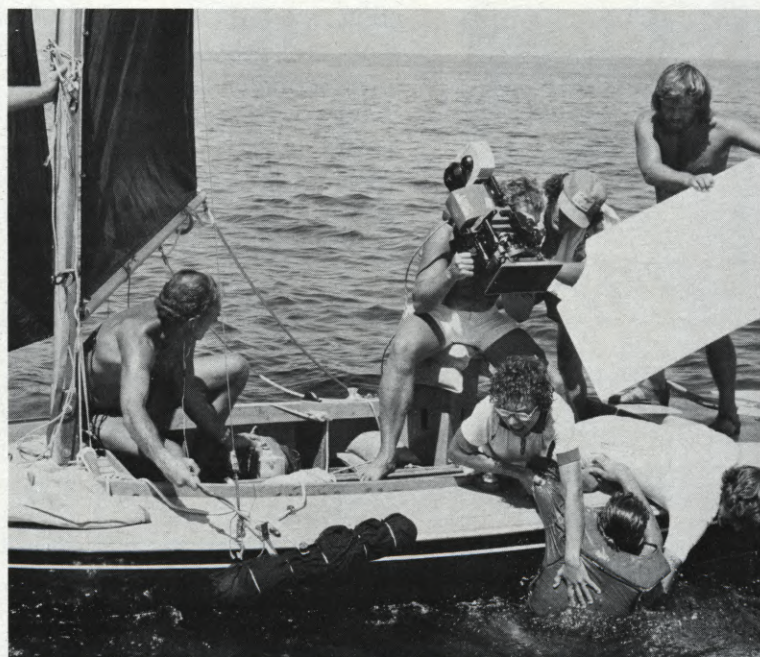
somewhat like the drum of a cement mixer. The cameraman fits inside this housing and has pan-tilt control of the camera by means of hydraulics. The camera can dive 6½ feet below the surface of the water and also rise up out of the water. I was very nervous about it because it took so long to build that by the time we got it finished we were almost through shooting the picture. However, it was worth the wait, because the footage looks fantastic. For example, we

used it to chase a water skier from underwater and never before have I seen anything move in an underwater shot quite like it does.

QUESTION: Who actually built the rig?

BUTLER: Gino Barragy. As I said, he's actually my key grip, but I had to replace him in that capacity on the picture because it took all his time to build this

(LEFT) Camera operator John Fleckenstine hangs far off the side of small boat by means of a body harness in order to get the desired camera angle. (RIGHT) The Hand-held Panaflex is used to film close shot of rescue operation. Whereas the original "JAWS" involved only one boat, the "Orca", "JAWS 2" involves multiple sailboats, ranging from small craft like this one to large sailing catamarans. Most of the teenage cast members had to be taught to sail them.



piece of machinery. It took about six months. Gino discusses the vehicle in greater detail elsewhere in this issue of *American Cinematographer*, (see page 359—Ed.)

QUESTION: Did you operate the “cement mixer” camera yourself?

BUTLER: Yes, I did—for two reasons. First of all, having spent six months in developing this underwater platform, it's just something I know physically how to operate. Secondly, by the time we had it operational, the director, Jeannot Szwarc, was stuck in the cutting room, and since I had been working so closely with him and the editor, I understood exactly what kind of shots he needed and to trust somebody else to get them, with so little time left, would have been risky. This is a very specific piece of equipment that is a bit tricky to handle, so I felt more comfortable doing it myself.

QUESTION: While the locale of “JAWS 2” is, like that of “JAWS”, supposed to be Martha's Vineyard, I understand that most of it was shot in Pensacola, Florida. Why was that?

BUTLER: We started with the original director in Martha's Vineyard and there was a second unit that went back there to grab some establishing shots of the town, but actually, 95 percent of the picture as it now will appear on the screen was shot near Pensacola. We recreated the town of Amity there. This was because, following the shutdown of the



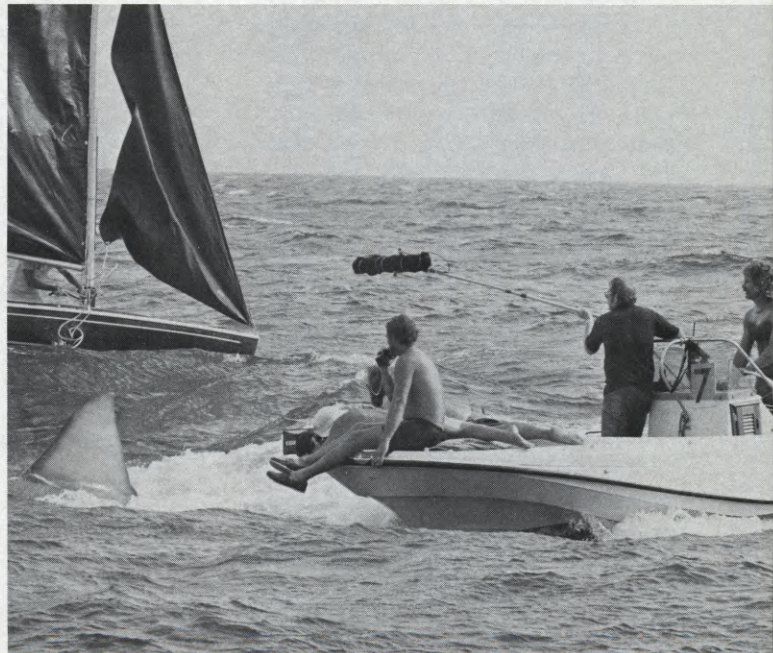
Looking somewhat less than happy about the whole thing, waterborne gaffer clings to rubber inner tube for buoyancy, while supporting sheet of white Styrofoam used as a reflector. These “white cards” proved invaluable for providing fill light on location in sunny Florida and minimized need for artificial booster units.

picture to change directors, time was running short. With a release date of June 16, there was no time to go back to Martha's Vineyard—nor, at that season, with winter approaching, would the weather conditions have been right. As it turned out, they weren't much better in Florida. On the last day of shooting in Pensacola it was 22 degrees on the water, which was quite uncomfortable to work in. It was snowing in Tallahassee.

QUESTION: Referring to what you said before about the mechanical shark moving too slowly, was it possible to help the situation at all by undercranking?

BUTLER: Yes, but you had to be very careful when the shark appeared in scenes with people, because you'd suddenly have an effect like the Key-Continued on Page 404

A great majority of the action of “JAWS 2” takes place on the water, and shooting these sequences was a continuing nightmare because of constantly changing weather conditions. The water condition changed in terms of chop and sky character about every 20 minutes. Since the sea reflects the color of the sky, a cloudy day would mean gray water, and a clear sky, blue water. Since the action was shot mostly out of continuity, matching sea and sky characteristics within a sequence was very difficult, requiring much paperwork and careful filtration.



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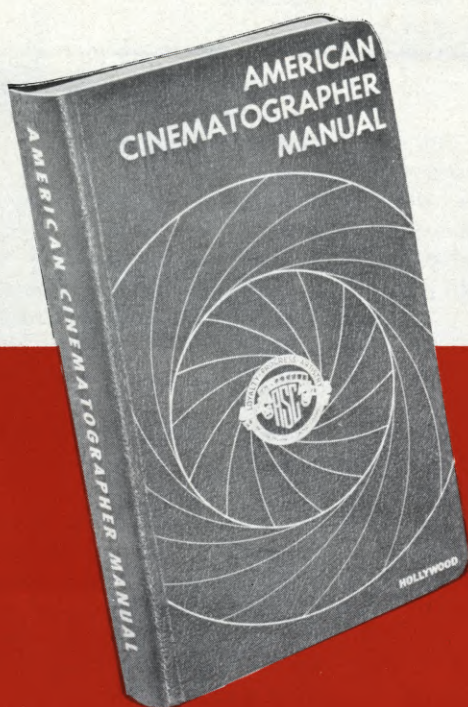
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TED VOIGTLANDER SEMINAR
Continued from Page 365

QUESTION: Did you use a Worrall head to follow the fly to its various positions?

VOIGTLANDER: It was an O'Connor head, with a good broad-shouldered operator to keep it steady. He wanted to try to outwit the fly, but with the wheels, he wasn't quite out-thinking him. You know, if you get a Worrall head with maybe a little bit of slop, and with that enlargement lens there, it's like using the Palomar telescope.

QUESTION: One thing that was impressive in the film was the way the eyes were highlighted. How did you do that?

VOIGTLANDER: I usually like to have a little inky-dink lamp with a snoot on it to highlight the eyes. I place it in the shadows and it picks up in the eyes only. In other words, it won't light the skin, too.

QUESTION: Do you use that with diffusion?

VOIGTLANDER: Yes, you put a scrim on it, or a silk, or spun glass, so that it won't be too strong. It doesn't have to be strong; just so it's there. You don't want it to expose where you don't want light. You can even work with a slit, and put tape across the snoot.

QUESTION: Do you have the light positioned in the direction the person is looking?

VOIGTLANDER: That's something you have to decide. The eye being convex, it picks up light from any direction, like a convex mirror. However, I usually like to use it on the side opposite to where the person is looking. You have to make up your mind. You can use it on either side.

QUESTION: Since you were working mostly with black actors on this film, did you take any reflected light readings?

VOIGTLANDER: No, I worked with the Spectra meter and took incident light readings, period.

QUESTION: But didn't you have to compensate for the black skin?

VOIGTLANDER: No. When I was growing up, I was assistant to Karl Freund, who helped develop the Spectra. (It was originally called the Norwood meter. Now it's the Spectra, but it's the same

thing.) Karl's theory was: "Black is black and white is white; you can pour a lot of light on, but it won't mean a thing." That's the theory of the Spectra meter. I use the reflective meter hardly at all. I used to when I started, but now I go right along with the incident reading.

QUESTION: Could you talk a little bit about balance between indoors and outdoors—like, for example, when he's sitting in the study watching the people outside. It seemed to me that you were letting the outside go just a little bit overexposed.

VOIGTLANDER: It's hard to remember the exact stops after all this time, but I probably shot him around f/8 and the background at the time was probably around f/11—just about a stop more.

QUESTION: Some cinematographers just let the exterior background burn up. How do you feel about that?

VOIGTLANDER: There are a lot of theories on that. I know that some cameramen like to let the background burn out, but personally I don't. For example, I did a picture about a year ago where we went to the 14th floor of a building to shoot. The director heard me tell the boys to put some neutral density filters on the windows and he said, "Why are you doing that? We don't have time for that." I said, "Sir, we are up on the 14th floor for a purpose—to see Los Angeles in the background. If you want to save time, why don't we shoot on the first floor where it will be easier and I'll just put a white sheet out there?" He said, "Go ahead." It's a matter of preference, but I like to see what I'm getting out there. So I use neutrals—or 85s, when I'm able to use incandescent light indoors.

QUESTION: When you have to change stops during a take, do you prefer to do it with the aperture or the shutter?

VOIGTLANDER: If it's a change of only one stop, the shutter is easier. If it's more than one stop, you'll probably have to do it with the aperture. I really don't like to make a two-step change; it can be noticeable. I'll usually go one stop and let it settle there.

QUESTION: Which way is smoother—with the aperture or with the shutter?

VOIGTLANDER: I think the shutter is smoother and it gives you a little leverage. The aperture is technically a little harder for the assistant, since he has to

follow focus also. My present assistant is very good at following focus, zooming and changing stops, too. We pay him a little more.

QUESTION: If you do it with the shutter, don't you have less image displacement than with opening or closing the aperture?

VOIGTLANDER: Every time you change your stop, you change your field. A lot of directors are not aware of that. They'll say, "That isn't the size of shot I wanted." I say, "Go look again, because when we changed the stop, we also changed the field." This characteristic is basically predominant in your zoom lenses. There's a tremendous change of field when you change the stop on a zoom.

JAMES POWERS: As a cinematographer, how much input are you allowed to make? For instance, the writer writes a scene and says, "Do it this way." But perhaps the director says, "Forget that. I want it this way." What do you do?

VOIGTLANDER: Well first of all, when you read scripts, you discover that writers dream a lot. I don't say that critically, because we need for them to do that. But it's the director who actually has to shoot it. He confronts me with a situation and we talk it over between us—more than he does with the writer. We try to work out a happy compromise. When it becomes physically hard to do, then you test it against whether the effect will be worth it or not. For example, I had a director who said, "The writer says we go down a hallway and end up shooting through a keyhole to include the scene taking place inside the other room." Well, I told him it could be done but that it would involve some complex technical problems that would take a lot of time to solve. There was the problem of getting your camera up to the keyhole without casting a visible shadow, lighting the room inside to balance, and making an aperture change in the middle of the take, among other things. I told him in advance just how long all this would take—and it actually took just that long. Because we went ahead and did it, but the next day the director got fired.

QUESTION: Because he took too much time he was fired?

VOIGTLANDER: Yes. The writer had written the scene that way and the director wouldn't compromise. This was for a "WILD, WILD WEST" television show. The shot looked great, but a tele-

Continued on Page 402

Comments on KEM by people in various kinds of film production:

The consensus: practical post-production tools for TV commercials, documentaries, industrials and feature films.

Hy Goldman:

Mr. Goldman is President of Forum III Films in New York. They've owned three KEM Universals for seven years on which they've edited nearly 2,000 TV commercials.

Committee

"I'm usually editing by committee," says Mr. Goldman. "Very often, I'll have the agency copywriter, the producer, the art director and the account man in the room. With the KEM, they can all see the screens, *sitting down*."

3 A.M.

"Sitting down suits me, too - especially at, say, 3 A.M. after working around the clock. I can scan 1,000 feet in less than a minute. And I can keep the interlock material in front of me and put up the out takes for comparison - all without standing up."

35mm and 16mm

"My KEMS have proved themselves over and over," says Mr. Goldman. "Recently, a client came in with 35mm original, 16mm stock footage, 16mm mag voice and 35mm music tracks. We cut it all on *one* KEM."



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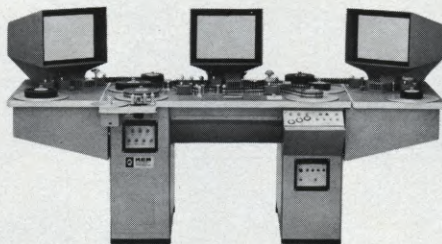
Frank Minerva:

Mr. Minerva is Vice-President of Editors' Hideaway in New York. They edit commercials and documentaries; and they own four RS Super six-plates.

Scratch Mixes

"The sound quality is superb on the RS," says Mr. Minerva. "We've made 1/4 inch to 16 and 35 mag transfers on our KEMs; and we make scratch mixes all the time."

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James Smyth:

Mr. Smyth is President of Optimus, Inc. in Chicago. They own five KEM Universals, all eight-plate. Their business: 90% TV commercials in 35mm, 10% documentaries, usually 16mm.

Better Take?

"You have 3,000 feet of sync, and the client asks: 'Isn't there a better take of Scene Six?'" On the upright, you know it'll take an hour..."

Dailies 100%

"But with the KEM," says Mr. Smyth, "You don't hesitate to go back and look. That's important creatively: You get 100% out of your dailies."

Maintenance 0.3%

"Last year, our accountant called to ask whether we'd made an error in our tax return. We'd claimed maintenance costs of 0.3% of gross sales."

Donn Cambern:

Mr. Cambern edited *Blume In Love*, *Cinderella Liberty*, *Hindenburg* and *Al-ex & The Gypsy*, on KEMs, in Hollywood.

First Cut

"Nowadays, the cast and crew tend to disperse as soon as shooting stops," says Mr. Cambern. "So the studio wants a first cut in two or three weeks, in case pickup shots are needed."

One Roll

"For this the KEM is *vital*, because I can explore the footage fast. With four or five takes on *one* 1,000 foot roll, I can compare them immediately. The high-speed forward/reverse gets me where I want to be in seconds."

"The image is big, the sound good and the machine quiet - so it's easy to imagine how the scene will work in the theater, and to pace my cuts accordingly. I can sit back eight feet from the KEM and watch a sequence play. Directors like that, too."

Smooth

"With the old upright," says Mr. Cambern, "I worked with the machine. With the KEM, I'm working with the *material* - the film."

Edna Paul:

Ms. Paul is President of Edna & Friends, Inc. in New York. They work on features, industrials, documentaries and TV specials.

Investment

"We used to rent uprights," says Ms. Paul, "But after trying the KEM, we bought one. It's an investment. The first time I used a KEM, I said: *Where has this been all my life?*"

Verna Fields:

Ms. Fields is a Vice-President of Universal Studios. A member of the editors' union since its founding in 1942, she won the Best Editing Academy Award for *Jaws*.

Black Uprights

"I grew up with the uprights - the *black* ones!" says Ms. Fields, "And I still use an upright as well as the KEM. But when something new comes along that offers a definite advantage... I wouldn't think of *not* using the KEM."

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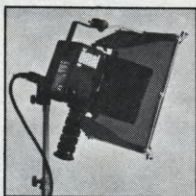
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
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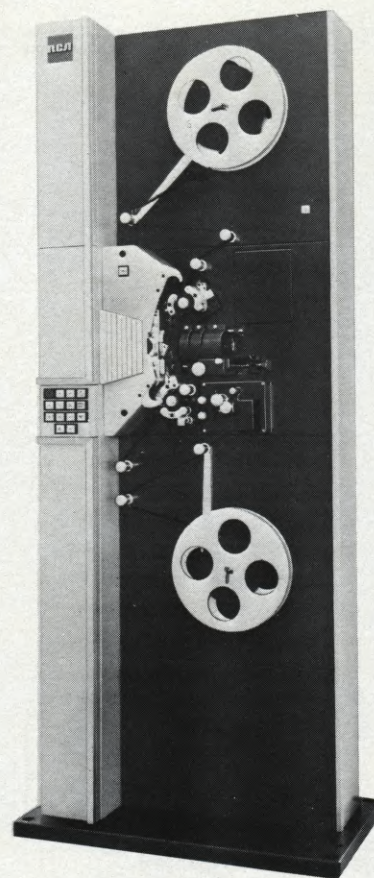
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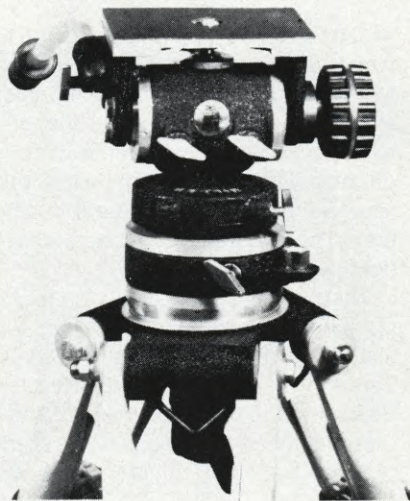
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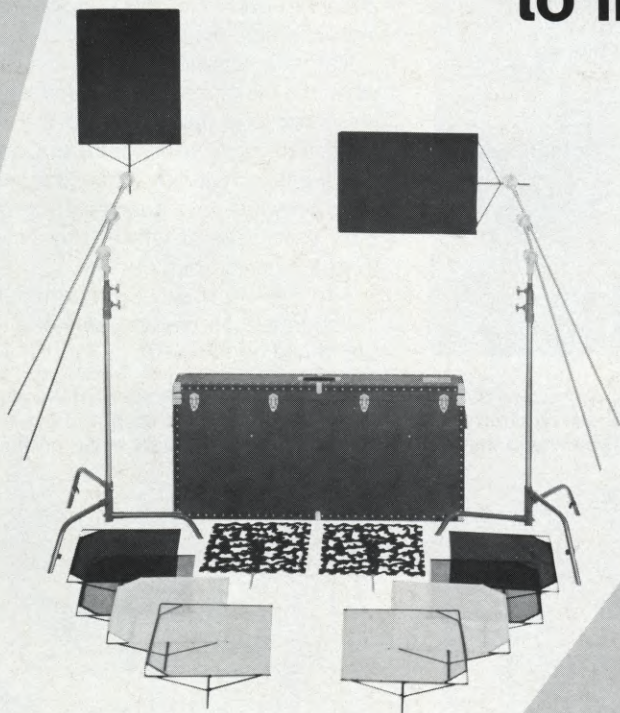
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TWENTY NIGHTS IN CLAY

Clay sculptures in motion, quite probably the most difficult form of animation, filmed as the prelude to a two-hour, prime time TV special

By DOUG FELLMAN

The concept of animating three-dimensional forms, including clay, is not new to filmmaking. Salvador Dali and Luis Bunuel were experimenting with the rudiments as early as 1928 in *UN CHIEN ANDALOU* and probably the technique had been used even before that. In recent years there has been a strong resurgence of interest in this technique, particularly in the Pacific Northwest.

Contemporary artists and filmmakers, such as Bob Gardiner* and Will Vinton, have been pioneers in taking this art form to its present state of refinement. **CLOSED MONDAYS** was the first commercially successful short subject to

utilize this technique, and since that time, clay animation has been employed by Northwest film production companies in everything from television commercials to educational and industrial films. The quantum leap to a clay animated feature film has yet to be attempted, but that's bound to happen sometime within the next year or two.

The project at hand was to create an opening for a two-hour, prime time television special celebrating the 10th anniversary of *Rolling Stone Magazine*. Basically, the concept was to show a group of small time musicians dreaming of "making it big" in the music world,

culminating in the band getting their photograph on the cover of *Rolling Stone*. When Bob Gardiner approached The Film Loft* in the middle of September (1977) seeking production assistance on this, his latest clay animation project, he had just completed a set of storyboards in collaboration with the show's director, Steve Binder, and one of its writers, Mason Williams.

The live-action (videotape) portion of the opening had already been shot by the time we were brought in on the project and was used to motivate the clay sequence in the following manner. The Rubinoos rock band is shown setting up for a practice session in a garage belonging to one of the band members. Just after they have started to play, the camera zooms slowly into the lead guitar player's face. At this point it is planned that the videotape will dissolve to film of Bob Gardiner's clay animation as the lead Rubinoos goes into his rock dream.

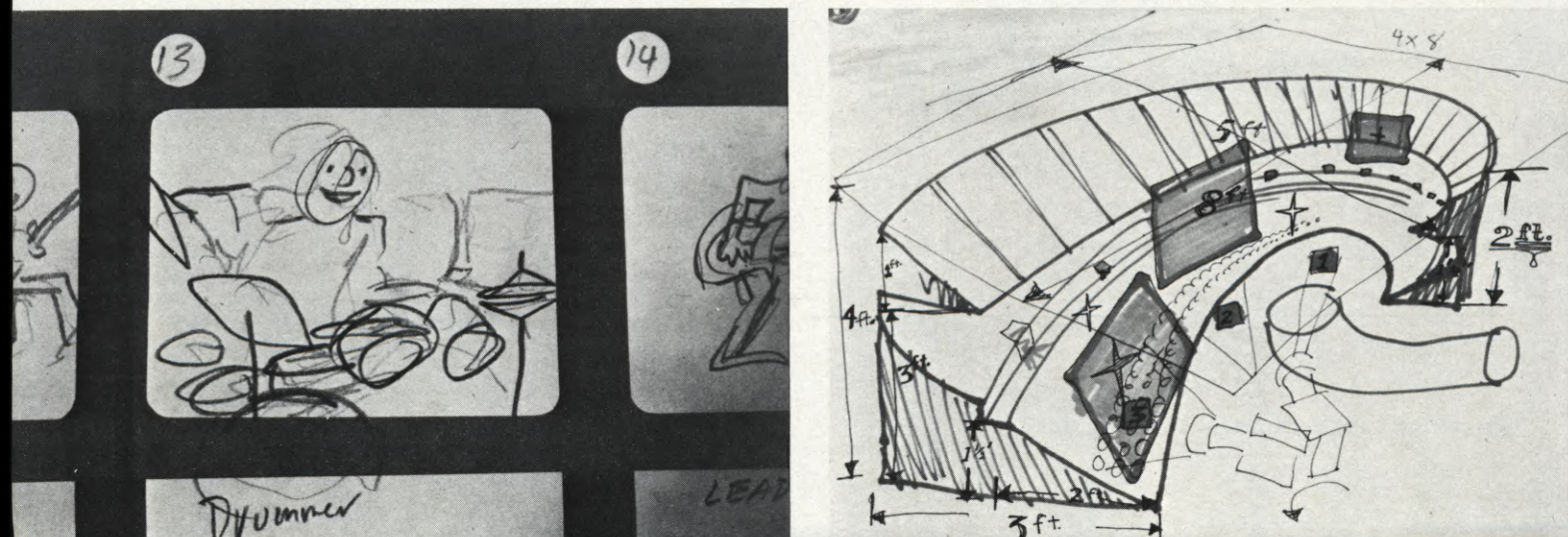
From this moment on, the storyboard calls for the camera to be almost constantly moving over the band and their audience at a very idealized rock concert. Everyone from President Carter to Patty Hearst is seen sitting in the crowd and even Andy Warhol is backstage taking pictures. All in clay, of course.

Naturally, Gardiner's assignment came with the usual impossible deadline . . . less than one month before the whole thing had to go to videotape! Counting one week for the lab (Teknifilm, Inc.) to have a few tries at a good color-corrected print, that left us exactly 20 days in which to generate the original film.

The Film Loft and Bob Gardiner had collaborated on several animation projects. **Continued on Page 401**

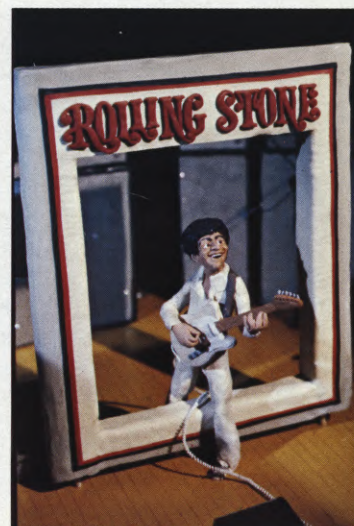


(ABOVE LEFT) For the clay animation sequence, produced by The Film Loft to open the Rolling Stone TV Special, members of the band are lined up in their "duck walk" pose. (BELOW LEFT) A frame from one of the preliminary storyboards. More detailed storyboards were done at a later date. (RIGHT) Early sketch of complicated "auditorium" shot. The camera pans left over a "sea of faces", past 1 and 2, ending with 3.





(LEFT) Mixing the palette. Fresh, heated clay is poured into special containers that form consistently sized blocks, blended by the artist. (CENTER) The clay is hardened into individually colored blocks. (LEFT) Standard shaped clay blocks ready for sculpturing. Although plasticine clay is commercially available in many colors, the artist prefers to buy white clay and blend his own hues. He also uses Day-glo and Bakehard (fired) clays.



(LEFT) Designing the Rolling Stone logo letters in Bakehard clay. (CENTER) "Main Titles by X-acto Knife". (RIGHT) The clay letters, attached to a clay magazine, stand ready for the camera. (The author, together with Dereck Muirden and George Hood, is a partner in The Film Loft, the film production company in Portland, Oregon, that was called upon to film the clay animation opening for the Rolling Stone special.)



(LEFT) Bob Gardiner, Academy Award-winning clay animator for "CLOSED MONDAYS" (Best Animated Short Subject, 1974), sets up to film a test for the TV special. (RIGHT) Gardiner's camera transport device. The screw movement permits the camera to make calibrated moves six feet forward and back. The arm rotates in a full 360° circle and the head can pan and tilt, as well. BELOW LEFT) Gardiner gives the finishing touch to the clay Rolling Stone cover. (RIGHT) The cover lighted for filming.



DIALOGUE WITH A PLASTICINE SCULPTIMATOR

Not simply a sculptor, nor merely an animator, is this artist who breathes cinematic life into uncommon clay

By GEORGE HOOD

Bob Gardiner has probably advanced the art of clay animation more than any other single individual of this decade.

In 1974 Bob shared the Academy Award for Best Animated Short Subject for the film *CLOSED MONDAYS*, which he sculpted and Will Vinton photographed. A clay animated multiplex hologram that Bob designed is a permanent exhibit at the Museum of Holography in New York. Both of these works testify to Bob's advanced understanding of the art of clay animation.

Bob's clay characters seem real. Well, not quite real, but hauntingly human. In *CLOSED MONDAYS* a wino accidentally stumbles into an art museum late one night. In his confused condition he imagines all of the paintings on the wall coming to life. The first time a closeup of the main character is shown, a strange silence usually falls over the audience. The clay face seems "life-like", almost human, unlike anything animated you've seen before. Bob's secret? A human skull is used. The clay, attached to the skull, animated one frame at a time seems to pulsate on the screen. The face goes through a multitude of expressions, including talking, all the while the eyes move about as natural as a closeup of a

"real" actor on the screen.

Watching Bob Gardiner work is like watching one of his clay characters come to life. If he's not sculpting or building strange contraptions for his films, he's darting about composing songs on his piano. Bob is just an animated kind of guy.

His studio, located on the 3rd floor of an old building in Portland, Oregon's Chinatown, is filled to capacity with the oddest assortment of props and people you could ever imagine—naturally, all in miniature.

Hiding in every corner or lurking behind boxes and equipment are "little clay people" who have appeared in many a Gardiner production. Assorted frogs, raccoons, and wolves (remnants of the Rainier Beer spot and *MOUNTAIN MUSIC*) stand frozen next to a huge nuclear power plant "clay man" (which appeared in the TV spot, "*Oregonians for Nuclear Safeguards*" produced by The Film Loft).

Recently, most of Bob's studio has been taken over by characters and sets for *The Rolling Stone Magazine Television Special*. Such luminaries as John Lennon, Frank Zappa, Hunter Thompson, and President Carter make up only a

few of the hundreds of clay characters Bob and his assistant, R.J. Randy Koch, sculpted for the special.

The interviewer, along with cinematographer Doug Fellman of The Film Loft, spent 20 incredible nights locked-up in this strange clay museum/studio helping Bob shoot the 45 seconds that open the show (see preceding article, "*Twenty Nights in Clay*").

A few weeks after it was in the can, Doug and I found ourselves back in this same amazing room conducting the following interview with Bob. Surrounded by a clay audience (who sat motionless during most of the interview) we were hoping we could get Bob to tell us some of his secrets. Bob interrupted the proceeding three different times to run over to his electric piano to bang out some melodies. We got the interview and Bob composed two new songs.

Q: Let's talk about the clay medium. How do you see yourself? Are you a sculptor, an animator, or a filmmaker. Exactly which are you, Bob?

A: Well, I'm not a woodcarver, not a big steel sculptor, or cement sculptor, or any kind of sculptor at all. I'm working in the realm of "Plasticine Sculptimation." I use plasticine—which is limestone, low temperature wax and oil—and other secret ingredients. I use that with private-utility-produced electricity, a camera and lens, with light receptive film emulsion and money. I still can't figure out how an image jumps onto the film. I look at film as entertainment and I look at myself as an entertainer, or an actor in a sense, through my fingers.

Q: You've been moving clay around and photographing it for seven or eight years now. How did all that come about?

A: Back in 1970 myself and a fellow named Will made a film called "CULTURE SHOCK". It was an exercise in "political erotic petty sensationalism". I sculpted, he clicked the camera and input came from all attending, anyone in the room. The film was entered into a festival and it won, and that's when I initially became inspired by my clay animation. At the time I was really sort of hung up in a lot of old European unique Western Art stuff. I discovered I wasn't

Clay artist Bob Gardiner and cinematographer Doug Fellman line up a shot for the opening of the Rolling Stone Magazine Tenth Anniversary TV Special. The margin for error in this type of animation is very narrow, since there are so many variables. Tremendous skill and patience are required to work in the medium at all.



like any kind of a 20th century modern artist at all. I thought a lot of people were getting away with mud.

Q: What do you mean?

A: Our culture is based on art as "art-letics." Art is a game; it's competition. Andy Warhol tactics have broken in and exploded the fine arts world. In any case, I decided to side-step the fine arts "racket" by getting further into clay animation. In my early films I had been pushing clay characters from point A to point B for quite some time without any relation to timing. It's very difficult to have any sort of instinct when you're moving one frame, and 24 moves make up one second. In those days it was almost impossible to assimilate timing.

Q: The idea of reference films came to you at this time?

A: Yes. I was working in this machine shop in Santa Ana for 10 hours a day and suddenly the idea of using a reference film came to me, out of the blue. At the time I didn't know if anyone had ever done it before. So I got the idea of filming actors. I definitely knew that breaking down an actor's motion to 24 frames per second and projecting it frame by frame would give me a tremendous guide for my motion across a field. It would also serve as a guide for the timing and the infinitely subtle things an actor would do that I would never be able to inject into a clay character one frame at a time, so I bought a stop-frame projector and the whole thing really got rolling.

Q: Did the reference film technique lead to CLOSED MONDAYS?

A: Exactly! I did CLOSED MONDAYS because I wanted to do a talking sculpture. I was an artist concerned with realism. I was a caricaturist, and yet I had never seen a really good talking sculpture. Even the ones at Disneyland are not together enough for me. So that was the main thing—to do a talking sculpture. In CLOSED MONDAYS we filmed the actor doing exactly what we wanted the clay character to do. When we told Todd Oleson, the actor, that he was going to be clay, he started throwing his feet over his head.

Q: CLOSED MONDAYS is a joy to experience. It works on many levels. It is a "pure" clay experience. Everything we see in the film is clay, is that right?

A: I was very strongly stressing through-



A closeup of the drummer and his clay drums. Every element in this scene is rendered in clay, including the bass drum, microphone and sticks. Characteristic movements were duplicated as faithfully as possible, using a reference film dupe taken from the original live action video tape.

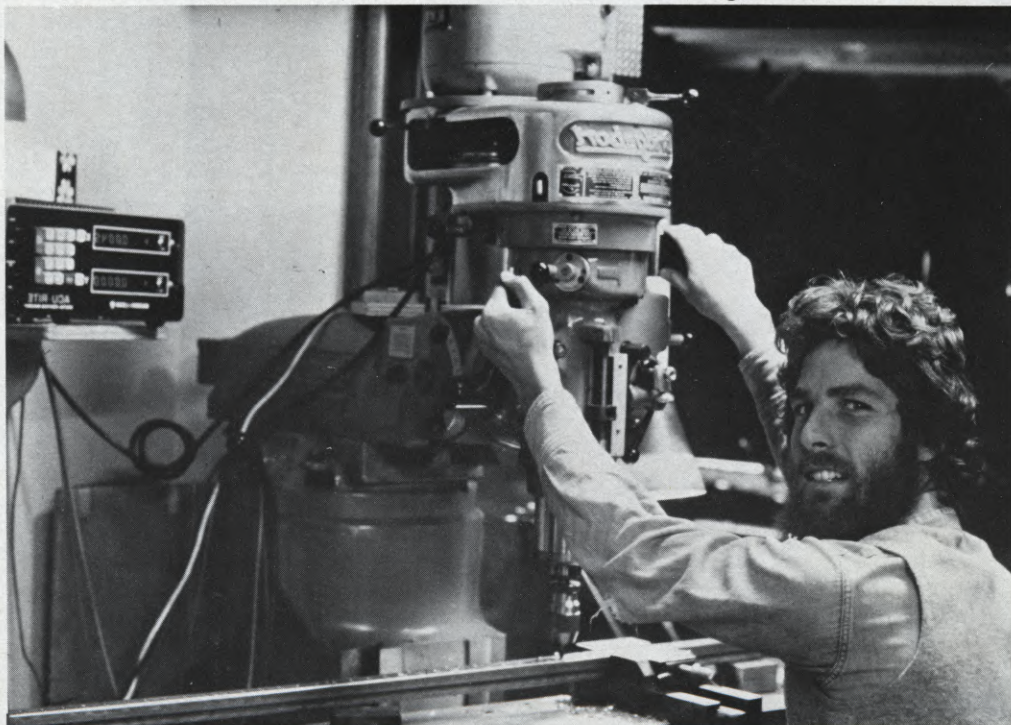
out the entire film the idea of using all clay, instead of getting into a mixed media trip where all of a sudden you see a piece of tin foil in this puppet set. It alienates you because you tripped on a technical hook. I was interested in doing an animated theatrical because of my art technique, as opposed to an animated cartoon. That's what CLOSED MON-

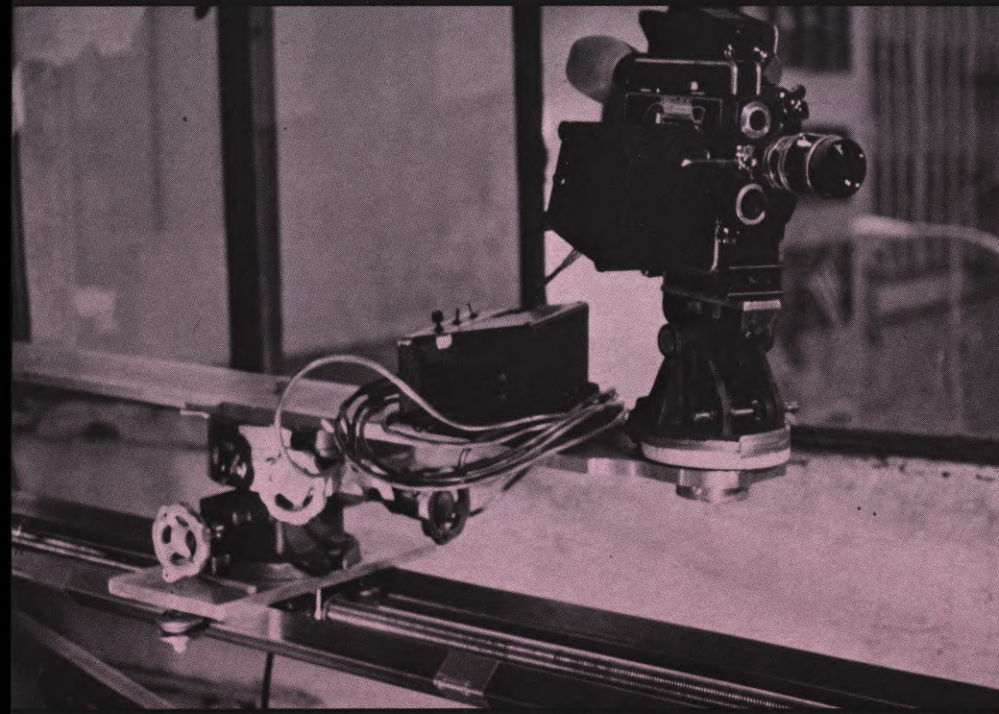
DAYS was to me, plus a minor tour of Western Art.

Q: Did you have any idea of the tremendous success to follow, after finishing CLOSED MONDAYS?

A: When I finished CLOSED MONDAYS I thought, "Well, that's the experiment and

Bob Gardiner's chief assistant and head machinist, Randy "R.J." Koch building the "Little Horse" camera transport device. Gardiner has developed many original inventions and techniques for executing this very demanding type of animation. Instead of guarding these as secrets, he willingly shares his expertise with other artists working in similar fields.





The "Little Horse" camera tracking device designed by Gardiner for the Rolling Stone Special. It consists of a general tripod head mounted on a six-foot-long screw movement device that somewhat resembles a converted lathe bed. The camera can roam freely in a horizontal plane the rough shape of a circle six feet in diameter.

adventure into art. I'll stick this in my portfolio and continue showing it to people in living rooms, the way I always have before." Suddenly, I get this OSCAR shoved in my face and the film goes all over the world! That (film) can have been places that I'd love to go to but have never been.

Q: Since *CLOSED MONDAYS*, and up through the recent *ROLLING STONE SPECIAL*, you have continued to explore and develop the science of clay animation with motion pictures. Your techniques have taken the entire field

of clay animation out of the dark ages of "Gumby" clay and into the technology of the future. What secrets can you share with us about your craft?

A: The biggest secret is photographing clay figures so that they look real. They will lose if they look like puppets. You don't want to get above the clay to photograph it. That's one of the bad things about our film *MOUNTAIN MUSIC*, the camera was always looking down. If you get level with the clay or slightly under it, it will look better. Cinemagraphically it's good to film the clay the way you film a

soap opera or any standard theatrical film. You get better impact and are able to relate normally to the psychology within the characters. The *ROLLING STONE SPECIAL* was shot very low, sometimes under the stage. Another secret is the "armature system" which I really refined on the *ROLLING STONE SPECIAL*. With better armatures, I got away from big clumpy feet on the band. The band's feet were in proportion to the rest of their bodies. Anatomically, they're probably more in proportion than anything I've ever done before. I've been through a million armature systems and I've finally found a way to do them that takes me about a day to make and they cost me about \$2.00 and they're, to me, the best system you can buy.

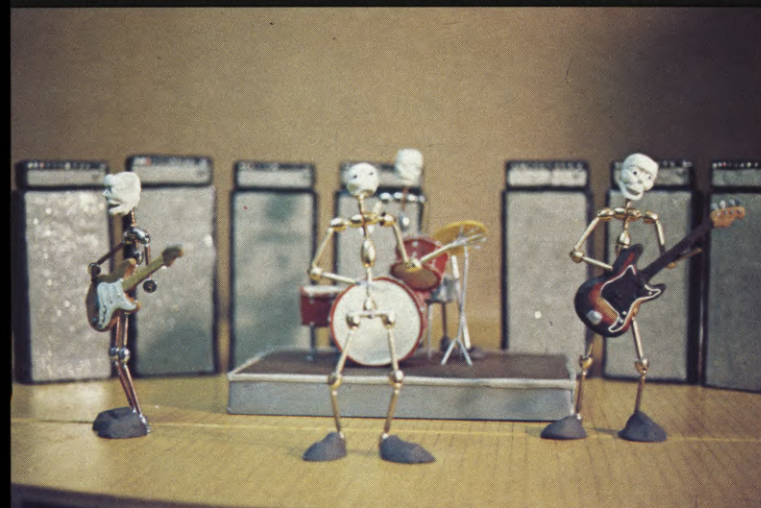
Q: Can you tell us about the system without spilling the beans?

A: Basically, what I do is build my armatures out of pen set ball-bearing sockets that go on desk sets. They've been lurking in my mind for some time. Welded together with brass tubing, they become the elbows, ankles, and knees.

Q: This becomes the frame that the clay is attached to?

A: Right, you have a flexible metal character at this point. In *CLOSED MONDAYS* the guy walks like he's wearing a hip brace. We were lucky to have a wino as a main character. If it had been a ballerina the film would have never been a success. I've gone in circles exploring techniques and in other places, I've made progressions. The armature trip is what I ultimately want to work more with, along with newer techniques using a

(LEFT) The rock band, "The Rubinoos", in their primitive skeletal form, the armatures having pen set balljoints for easier movement. (RIGHT) The band members, now fully "dressed" in their external clay, beat out a tune for the master scene. Doug Fellman's lighting for this sequence was designed to resemble an actual stage lighting situation. Almost nothing was shot without colored gels in front of the lamps.





(LEFT) "What are we doing here?" Little clay people haunt every available space in Bob Gardiner's studio. (CENTER) In a kind of clay "self portrait", Gardiner is shown lost amidst Portland's famous rose gardens. (RIGHT) The main character in the Academy Award-winning short, "CLOSED MONDAYS", proudly displays the Oscar he won. Bob Gardiner and Will Vinton were presented with actual full-size replicas.



Bob Gardiner's "Oregonians for Nuclear Safeguards" television spot, produced by The Film Loft, shows a nuclear cooling tower sculpted in clay overlooking the mighty Columbia River, which is fabricated of Mylar. (BELOW RIGHT) The 360° revolving stage designed by Gardiner for a Portland Parks and Recreation spot. (Note the primitive camera tracking device which was used before the invention of the "Little Horse".)

grid and video system with reference film.

Q: You see a real future in clay animation?

A: Yes, I think clay animation is one of the best things that an artist who is interested in film can get into, because you work in wood, you work with photographic film, metal, sculpting; you work with painting, lighting, the physics of lighting, and reference film technique, and you work with editing and music. You become sort of a weird property man when you're dealing with this stuff.

Q: What are the different types of material that you use?

A: The material list goes something like this: plywood, nails, screws, fiberglass, black plastic, clear plastic, styrofoam egg shapes, painted beads for eyes, plastic skulls, real skulls, pen set swivel joints for armatures, brass tubing, tapping, dieing, and drilling tools, hack-

saws, rolling pins, Grumbacher pigments for the clay, hotplates, all sorts of different spatulas for sculpting tools, cardboard dowels, all types of clay, latex, paint...

Q: And gaffer's tape?

A: Tons of gaffer's tape!



Q: What are the types of clay used?

A: I've found five different types of clay material that I use. There are two companies in Los Angeles that make good plasticine in a variety of colors. I buy their white clay, melt it down in pots and make my own palette, like any artist would. I have some clay I get imported from



The replica of Hunter S. Thompson in the early stages of its short life in clay. Gardiner often works from still photos in place of a live model. Quite often he uses 24-frame live action film projected in stop-frame motion to authenticate movement patterns in animating his clay characters.

Switzerland called Caran Dâche which was suggested to me by New York clay artist, Elliot Noyes. The clay has really beautiful color and is much softer. I use "day-glo" clay, along with two types of bakehard clay. That's the kind you bake for 20 minutes and it looks like it's made out of clay, except that it's hard. The *ROLLING STONE* magazine letters were made out of that material. I recycle most of my clay.

Q: Besides clay, a lot of your attention has gone towards wood and metal.

A primitive armature system of the type used before the ball-joint process was perfected. Gardiner further refined his armature system on the *Rolling Stone* project, getting away from "big clumpy feet" on his band characters and building them in actual anatomical proportion to the rest of the bodies.



A: I found myself deep into this whole phase of working with wood. Later, I went to a machine shop, learned about machinery and working with metal. I could have an entire Universal lot in miniature. I could have every set, to scale, stacked in this very room!

Q: How does it make you feel to see other clay animators copy your work?

A: When I did *CLOSED MONDAYS* I was very proud of the techniques and went around telling everybody I could. I

couldn't patent the techniques so I just wanted to get people interested and excited about them. When you start trying to hide your techniques you limit yourself. I had a hard time because I felt that my ex-partner ended up taking a lot of the credit for what I considered to be my inventions or my techniques. But that is over with and I no longer care about guarding my discoveries. Clay animation offers much more for the classic artist. The ultimate thing to me has been the literal full animation that could rival a Disney cartoon, with nice fluidity and in 3-D. You see, I don't have to worry about all that shading. I take a light and move a clay character around in that light. What I've done is avoided hours and hours of shading which you can't do very easily with cel vinyl painting.

Q: Do you see Portland as any kind of a clay center? Why is it all here?

A: I came to Portland from Southern California to make *CLOSED MONDAYS* and got stuck here because I love it here. The architecture is old, the level of living is good, the people are fine and it's a "city". It has a cold side, but it's real. But the main reason I moved here is because I know that Man has traditionally had artistic renaissances in northwest marine climates. I feel Portland has absolutely no way out of having a renaissance... cultural, intellectual, and artistic, probably in the next 50 years. I think it's going to happen right here. The same way I think England is going to solve the energy crisis. I'm still an artist; I draw. Your town is your studio. As a studio town, Portland is very good. I really don't need to live in Burbank to do what I do.

Q: One of your trademarks, or easy to recognize Bob Gardiner stamps, is the incredible "metamorphoses" you do, where one clay figure melts into another. How long does it take to do?

A: The metamorphosis sequence for *CLOSED MONDAYS* I sculpted in one night. I left it as the dessert for the entire production. It was the part where I could be loose and free a little bit. It really is the improvisational section of the work, actually forming and transforming characters on-camera. For me, instead of doing my lap dissolves in the lab, I should probably melt a set. I should metamorphose one scene into another. Every chance I have to do something in "clay" I should do it, as opposed to in the camera or in the lab.

Q: Can you tell me something about the moving camera device used on the

ROLLING STONE SPECIAL?

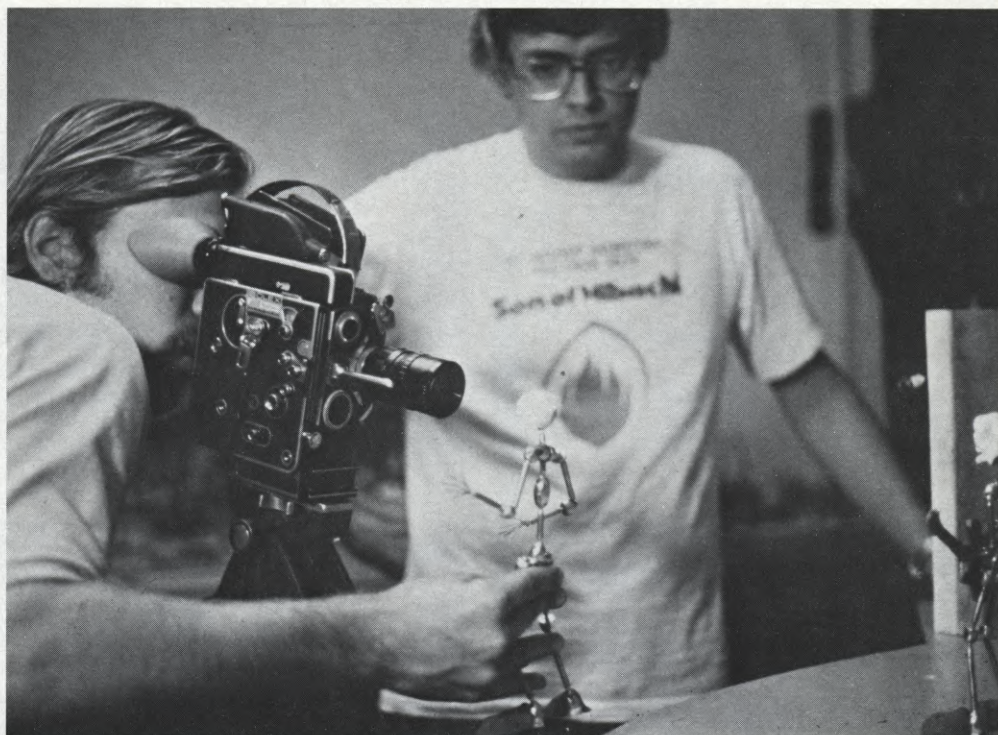
A: I call it "little horse" and that's what it looks like. It has a moving neck and, at the point where the neck is, it's flexible. With the main track bed I can go back and forth six feet on a threaded shaft. Then, with the turntable device, I can spin the camera 360° with an incremental dial. Having a moving camera really developed a lot of the "fluid feel" of the ROLLING STONE piece. Being able to move around the characters, backstage behind the lamps. All of these moves simulate what a real cameraman might be shooting. There are potentially six twists of the little horse for each frame. It plots curves through space, which, incidentally, is curved. The camera tracker device takes advantage of the fact that this is four-dimensional (time). You'd have to go to great lengths to get all those different perspectives if you were doing conventional two-dimensional animation. As with 3-D, it takes you where you might want to go, if you could fly! With the ROLLING STONE production, having The Film Loft doing the cinematography and lighting left me free to concentrate on my role, that of producer and artist. If I had done the lighting and cinematography myself, it would not have been nearly as good. Film is so comprehensive that it's hard to be a lone animator.

Q: What advice do you have for any up-and-coming animators?

A: My advice to animators is: "Don't move to Russia!" No, seriously, my advice to animators is to keep their dream intact. Don't blow it by telling everybody too much about it. Don't deflate all of the Zen out of it. Produce it while it's hot! If you've got something important to say, protect it and nourish it, and say it in the cleanest way possible, because there's already too much mud on this planet. And when it's finished you've got to figure out how to keep your film from landing on the shelf.

Q: What about the future, Bob, where is it leading?

A: I think of myself as exploring clay animation pretty far, but I'm not quite there yet. I'd like to make a really good ecological film. One that doesn't leave people in confusion, one that gives a direct message and hope. The one thing that the world does not need is another half-baked ecological statement. I'd like to shed light on the path for the world's technicians, like H.G. Wells did, and help us abandon mass production of



Gardiner and cinematographer Doug Fellman discuss shot compositions with the clay characters still in the armature stage. Gardiner has developed techniques which permit movements to be grossly exaggerated for effect. Characters can perform actions which seemingly defy gravity, and forms can "metamorphose" from one into the other.

transuranic contaminants of a highly mutagenic nature. We must concern ourselves with radiation's role in biological evolution on this planet. We must watch out for significant changes. I think that the most important things we have to watch out for are the solar laser, the solar pre-amp, and the gravity battery! I'm convinced of it.

Q: That could be a ways off, Bob. What about now?

A: Right now I'm working on a clay ani-

mated feature film that I've written with a fellow artist here in Oregon. I don't want to say too much, but it deals with biological evolution. I'm going to be looking for a producer for it who will have to be a bizarre fellow. He's going to have to be a great gambler, or more likely, it will be someone like me, who knows it's not a gamble, but rather, a sure-fire thing. As far as the future is concerned, I think clay animation has the potential to be just as well accepted and respected as two-dimensional animation. I think I've helped to make that happen. ■

The author, cinematographer George Hood, lines up a shot. For the Rolling Stone project, the desired effect called for maximum depth of field, so lens apertures in the neighborhood of f/8 were necessary. This ruled out ECO (7252) and made Eastman Kodak Negative (7247) mandatory.



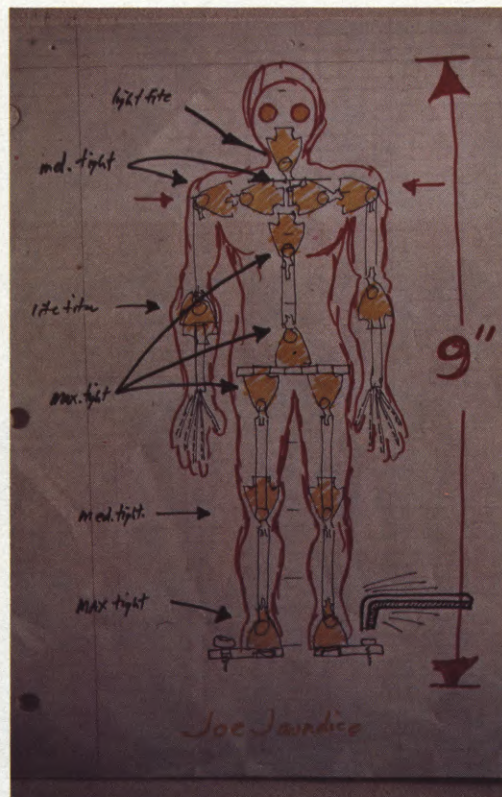


(LEFT) The set construction of the auditorium. Literally hundreds of clay "people" (each of them two inches high) are packed into this auditorium, which is seen on the screen for only three seconds. (CENTER) The sea of faces in a medium shot of the auditorium. Everything, including the aisles, is constructed of clay. (RIGHT) The final shot. As the camera pans the auditorium, tiny pin-point flashbulbs, photographed with a star filter, burst from the crowd, as the red spotlight scans the faces.



(LEFT) A medium shot of the audience. Patty Hearst can be seen in the center of the front row. (CENTER) Getting the blue elephant ready to receive a gift from President Jimmy Carter. At the height of the audience reaction, Carter flips a peanut back over his shoulder into the elephant's mouth. (RIGHT) A close shot of the band. Note the detail in the guitar, cords, microphones, amplifiers and monitor speakers.

(LEFT) As a guide to realistic movement, a live action video tape of the band was shot weeks before going into production on the clay animation portion of the sequence. (CENTER) "Victor Armature"—an early sketch of the swivel-top pen set ballpoint armature system used as bases for the figures. (RIGHT) An armature man, before the clay is attached, holds his Bakehard guitar and stands in for an early test.





Jimmy Carter, in an amazingly accurate clay characterization, seems to be enjoying the band's performance.

TWENTY NIGHTS IN CLAY Continued from Page 392

ects previously . . . mostly in the realm of 30 and 60-second public service and political TV commercials . . . but nothing of the complexity and scope of this undertaking had been tackled before by any of us. The first step was to settle on a philosophy of our general approach to the shooting, in order to assure that there would be choices available to the editor, while at the same time keeping our shooting time to a minimum.

One thing that experience had taught us in the past was that no matter how carefully a specific shot is calculated and pre-programmed, there is always a good chance that something won't work when the workprint is finally projected. And two of a dozen variables can conspire to destroy the desired effect. Movement of the characters can be too fast, too slow, too jerky or too smooth. These same parameters also apply to the camera when it is in motion.

We determined that the best approach would be to cover each section of the music with one shot tightly scripted frame by frame, from the storyboards. On top of this, we hoped to shoot at least one cutaway or improvised action shot for each section. Then, when that inevitable shot turned up with some sort of flaw, the editor would always have an alternative

take to go to.

In essence, Gardiner has evolved his technique into two distinctly different approaches. The first style, which might be regarded as the closest to realism of the two, relies heavily on the use of reference films to determine movements of characters, changes in facial expression and even camera position. For example, in a case where the artist wanted to have a clay ballet dancer twirl across the screen, a live action shot would be set up positioning the camera to approximately the same perspective as the animation camera, and several takes made until the action was satisfactorily recorded on film.

This good take would then be projected one frame at a time (using a stop-frame projector) onto a screen placed just beside or behind the set so that the animator could refer to it in the same manner as a classical oil painter would refer to his model. This technique solves all the obvious problems of how far to move each limb of the clay character between frames, how much his smile should change, how his eyes should move, and so on.

In the preparation stages, a detailed animation log similar to the type used for conventional cel animation is drawn up with a line on the page for every frame. A column is devoted to each possible variable and detailed instructions are given for such things as start and stop points, camera move increments and "feathering" movements in and out. The end result of this approach is very similar to a crude rotoscope of the original reference film.

Gardiner has a second, more impro-



Some of the figures which appeared on the very edge of the frame were only "half" sculpted. Note the Styrofoam ball head construction.

vised approach that does away with the reference film and, to a large extent, the animation log as well. This technique allows the artist to deal with fantasy as well as reality. Movements can be grossly exaggerated for effect, characters can be made to perform movements that seemingly defy gravity, and forms can

Famed far-out artist/filmmaker Andy Warhol is depicted in the sequence as taking photographs backstage. Behind him is an unidentified roadie. It requires incredible care and skill to create in clay instantly recognizable likenesses of famous personalities—and even greater skill to animate their features realistically.



vision schedule just doesn't make allowances for such elaborate setups.

QUESTION: Could you explain what a timed print is?

VOIGTLANDER: Yes. As a simple example, let's say that I am shooting outdoors at 3:00 in the afternoon and the light has gone yellow. An 85 filter is supposed to bring average daylight (5300°K) down to 3200°K, but now we've got light that is about 4700°K instead of 5300°K. So I put on an 81-EF filter, which is 800 degrees cooler, to raise the color temperature. But it's still not cool enough; it's still a bit too yellow. The lab, in "timing" the print, takes out that excess yellow. They use a Hazeltine machine to "time" the scene accurately and appropriate filters to actually make the correction.

QUESTION: Does the lab do all of the correction?

VOIGTLANDER: Well, I go along with the theory of my old professor, one of the greatest cinematographers in the world, Robert Surtees. I worked with him for a long time and he always believed in what he called the "inherent negative". We did a picture in Egypt together and he color-graded the whole thing with filters as he shot it. The lab had very little left to do. But he believes in the inherent negative—leaving the lab less to do in the timing—and I believe that, too. Tiffen puts out what they call coral filters, which is a whole range of color-correction filters. I'm inclined to make such corrections in the camera myself if I have time. In television, you don't get that much time, but on your big features you can do it.

QUESTION: Does that mean that you would have to be taking quality of light readings more often?

VOIGTLANDER: Right—and changing your filters. You have to have a color temperature meter and the range of filters to make the corrections. It requires making little computations for all the different filter factors, but I still believe that the less the lab has to do, the better.

QUESTION: What happens to the sky when you substitute the 81 filter for the 85?

VOIGTLANDER: A good question. The blue does go a little bit cool, a little more blue, but hopefully, when I get into a

situation like that, I never have to show too much sky.

QUESTION: You wouldn't make such a change in the middle of a sequence, would you?

VOIGTLANDER: Oh no, I would never try to intercut within a sequence. For example, if I start a sequence and I'm force-developing it, I'd want to stay that way. I've caused problems for myself because I've started a sequence when it was overcast and an hour later the sun came out. In a case like that, I'd say, "What do we do now? This is terrible, because it won't cut together. You were flat and cold and now you've got high contrast." Sometimes I've had to try to talk them into shooting things over. But you try to look ahead, try to stage things with the weatherman and everybody else in mind.

QUESTION: How do you work out the problem of fluorescent fixtures?

VOIGTLANDER: If you've noticed, there's a lot of green in most fluorescent lights. I do nothing about it, although they do have filters to compensate for the green. I did a picture not long ago where we had to work in the editorial room of a newspaper and it was totally lit with fluorescent fixtures. There must have been 80 of them overhead, with 100 footcandles on every desk. I measured the light with my color temperature meter and it read 4000°K. So I filtered my kickers and fill lights to 4000°K. Then I called the lab timer and told him that I was going to light everything for 4000°K. Knowing that, he was able to bring the whole thing down to 3200°K in the timing.

QUESTION: To get your lamps down to 4000°K, did you put them on dimmers or gel them or what?

VOIGTLANDER: I didn't get them down; I built them up. I used Rosco half-blue gels which brought me up to about 4000°K. In the one-light workprint it didn't look too bad, although it wasn't what we wanted. But the lab, in timing, brought it down to 3200°K for the release print and it looked very natural.

QUESTION: But couldn't you have gotten that same result by simply putting a filter on your lens and bringing the whole thing down from 4000°K to 3200°K?

VOIGTLANDER: No, because when you put a filter on the lens, you are affecting everything in the scene. If I had done

what you suggest, the fluorescent light would have been corrected, but my kickers and fill lamps would have been the wrong color temperature.

QUESTION: Do you feel that directors sometimes get into crazy shots that add nothing to the picture?

VOIGTLANDER: I guess you could call some of them crazy shots. For example, I was doing a medical show one time and the director had seen something they'd done in New York on a picture. He wanted to do the same thing. He had a scene with a doctor talking to a patient and he wanted to start with the doctor reflected in the guy's eyeball. We then pull back to show the doctor and the patient. Well, that took a little planning. For various technical reasons, we couldn't use a zoom lens, so we got in real tight with, I believe, a two-inch lens—which was practically in the patient's mouth. Then the director kept insisting that we pull a string or something in order to get the camera back fast enough. Directors do come up with crazy things like that once in a while, but they're interesting.

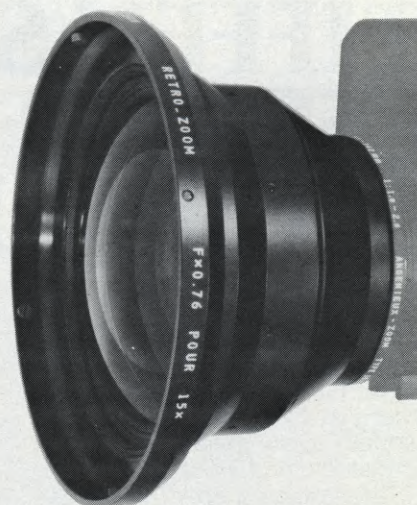
QUESTION: I read somewhere that there's a twilight moment at sunset when the sun's gone down and the light tends toward the red end of the spectrum. In such a case, would you leave the 85 filter off?

VOIGTLANDER: That's the mystic hour. Yes, you can leave the 85 off—unless there's a special circumstance. For example, we were doing a picture in Colorado and I was about ready to wrap. The fog and clouds came over and then, all of a sudden, there was a rainbow in the sky. The director said, "Gee, let's make this an early morning shot. Get the cowboys back in the bunkhouse and we'll have the Chinese cook hitting the triangle for breakfast." In that case, the rainbow was the only color left in this scene and if we'd pulled the 85 filter, there would have been no color at all. But a lot of cameramen do pull the 85, as you questioned, and I sometimes do it for reasons of economy when the light gets very low and added blue doesn't bother anything.

JAMES POWERS: Does anyone have any more questions or have we picked Mr. Voigtlander clean? (Laughter.) Thank you very much. It's been a pleasure.

VOIGTLANDER: You're welcome. (Applause.) ■

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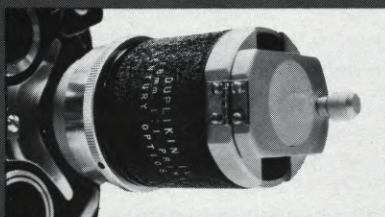
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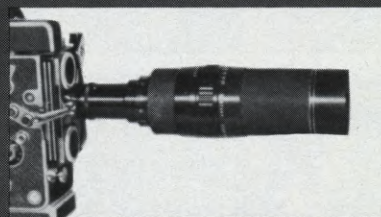
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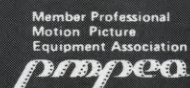
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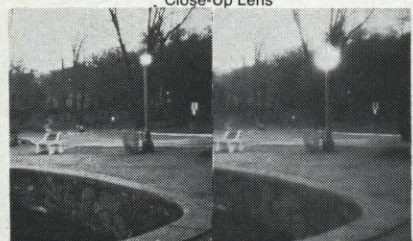
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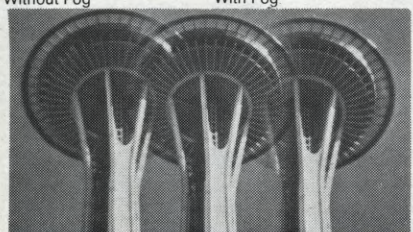


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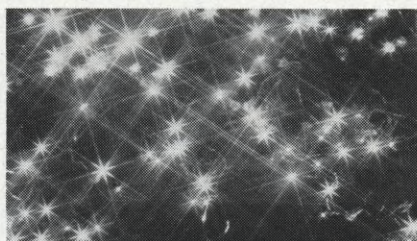


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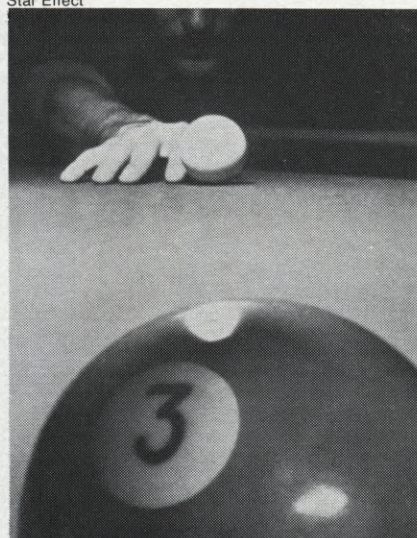
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PHOTOGRAPHING "JAWS 2" Continued from Page 383

stone Kops. Water is very difficult to undercrank, too, because the surface tends to take on an animated quality. When we were shooting the shark by itself, under certain conditions, we did undercrank, but primarily where we needed it the most was where it exposes itself and comes up out of the sea, and those scenes usually included actors.

QUESTION: From the photographic standpoint, what problems did you encounter in trying to make Florida look like New England?

BUTLER: I had a great deal of difficulty with the sand on the beach near Pensacola. It's one of the most beautiful beaches I've ever seen, but the sand is absolutely snow-white. As a matter of fact, it was like working in snow, except that with snow scenes you usually don't have such intense sunlight. In this case, with the ultra-white sand and the harsh tropical sunlight, all I could do was try to knock the glare of the sand down a bit by using Harrison graduated neutral density filters.

QUESTION: Did you use filters very much otherwise?

BUTLER: For the most part, we didn't. This is obviously not a moody picture. It's not a love story; it's a monster movie, so we tried to keep it fairly clean and crisp. But there were times when, for technical reasons, I had to use certain filters. For example, being in a tropical climate, we had a condensation problem—not so much a condensation on the lenses, but a build-up of condensation in the atmosphere. When we shot on the beach we had what looked like an overhanging haze all the time. We shot for the first month trying to find out what was causing the problem and how to solve it. When we discovered the cause, we started to utilize it to our advantage in terms of giving the beach a high-key feeling of warmth. The high reflective quality of the white sand, combined with the condensation, created a very appealing look—so we kept that. But since we were shooting out of continuity much of the time, I had to employ filtering in order to keep that look consistent. In other words, as we went on shooting through the winter, the condensation evaporated, because without the heat you don't get that condition. So we had to use filters in order to maintain the effect.

QUESTION: Did you use fog filters for

that purpose?

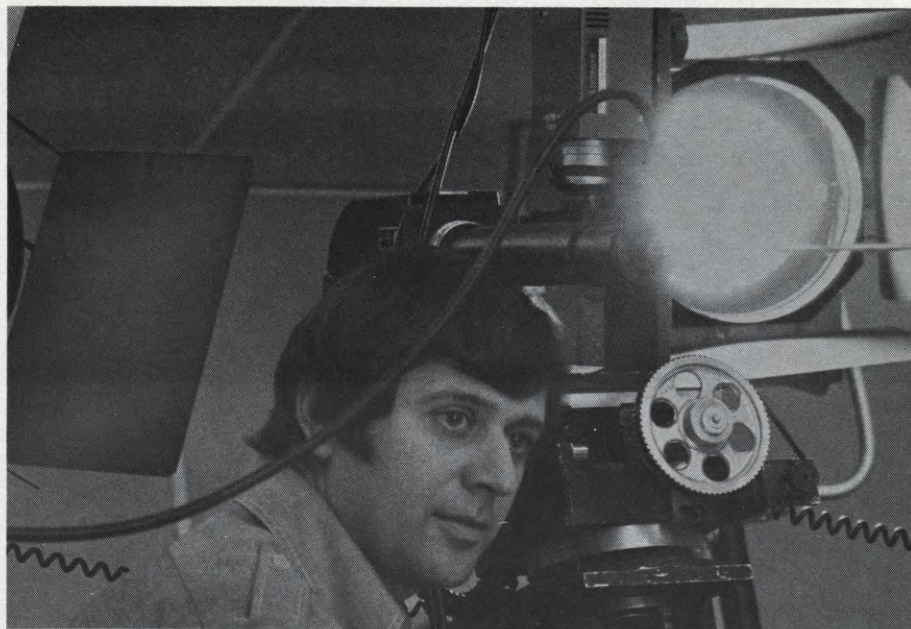
BUTLER: No. We tested with various fog and diffusion filters, but Harrison came up with a filter for me that was somewhere between a double fog and a low contrast, but to a lighter degree. The others were too heavy for the little bit of condensation we were trying to match. On the water itself I used a combination of different skylight filters in order to keep the blue when we were losing it. Some days were bright and some were overcast, so I tried to hold to a happy medium—neither too contrasty nor totally subdued. Since I had to deal with a five-month spread of varying climatic conditions, I didn't want to get tied into too high or too low a contrast, because I knew I wouldn't be able to correct it later. I realized in advance that I was going to be faced with that problem, so I worked with the lab very closely in the pre-preparation phase on the possibility of desaturation. I didn't intend to desaturate in the original negative, but I wanted the option left open to me in post-production. They had used desaturation on the original "JAWS", but without any pre-thought. They simply did it in post-production because there was no other choice. I didn't want that to happen. I wanted it to be pre-planned, so that I could deal with it while we were shooting. In the tests we made it worked very well. What it did was give me that medium balance I would need when we had to shoot on excessively high-key days or in overcast. I was able, as a result, to moderate both extremes so that they would balance.

QUESTION: Speaking of filtration, as we were, were there any other unusual uses of filters that you made on the picture?

BUTLER: Because we shot so much out of continuity, the only significant use of filtration, for example, would be when we shot a sequence at sunset and then had to come back at some different time of day to finish it. In a situation like that I would filter by adding amber tones to lend it more of a sunset feeling.

QUESTION: In a case like that, where you have to alter color temperature to match something shot at a different time of day, do you prefer to do that yourself in the camera or would you just as soon instruct the lab to do it?

BUTLER: Well, I've done it both ways. In the one instance, I've given the lab a straight negative and left the corrections up to them. And then I've done it the other way—as on "MISSOURI



Award-winning Cinematographer Ed Winkle on the use of HMI lights:

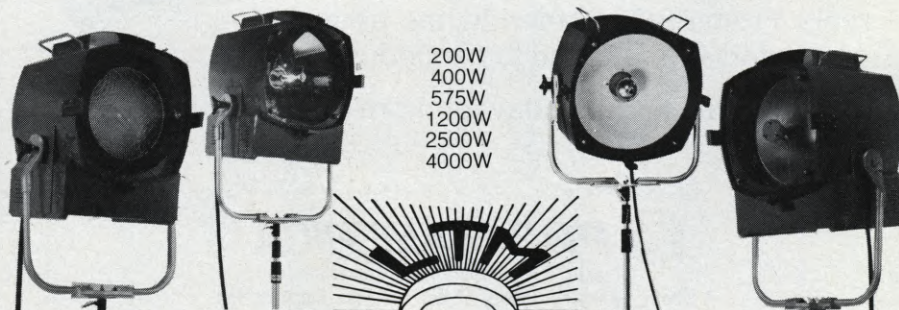
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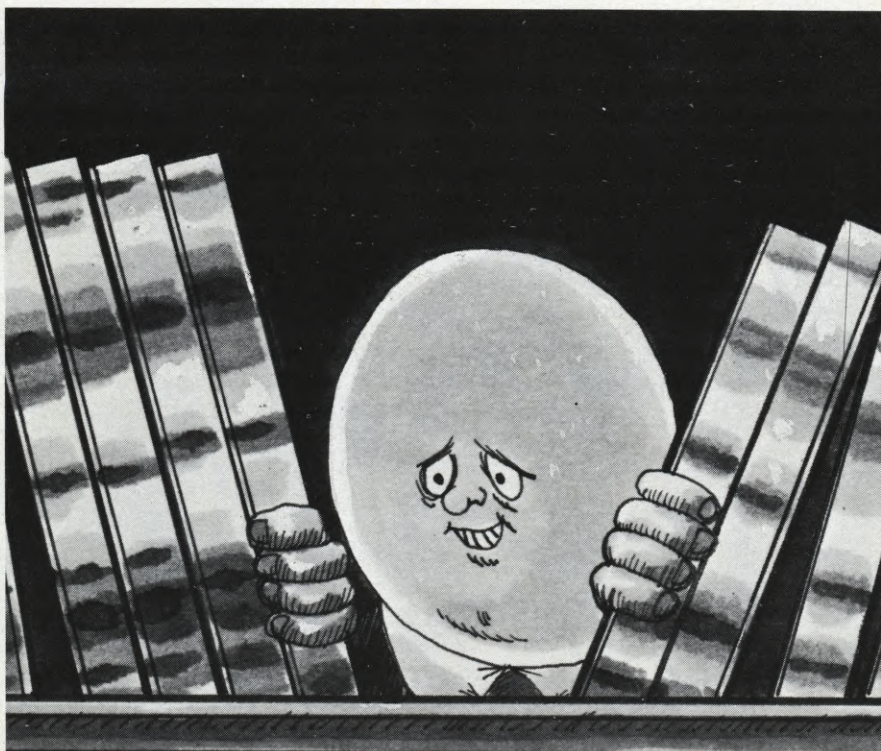
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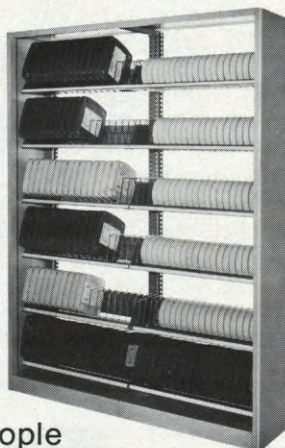


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BREAKS"—where I've done everything in the camera and nothing in the lab, except for slight adjustments in the final timing. But I find that there is a happy medium between the two methods and it can be achieved if you let the lab know what your intentions are. I think it's extremely important for the cinematographer to have clear communication with the color timer in the lab right from the beginning of the picture. I had no problem because I had experienced both procedures before, so when it came to a situation like the sunset thing, I communicated with my timer and let him know what I was going to do and the effect I wanted to achieve. But to answer your question, I think a combination of the two is the way to go.

QUESTION: Will you have the opportunity on this film to sit in with the timer on the final timing for release prints?

BUTLER: Absolutely! That's part of my agreement with the producers and the director—that I would truly time the picture. Because of the tremendous amount of shooting out of continuity and filming on the ocean, where elements change so rapidly, the timing procedure on this picture is especially delicate. I don't think we had the problems, as they did on the first "JAWS" of being so greatly mismatched, but this is a sequel and I would greatly appreciate having the picture received visually on a lot higher level than that of the original picture. So, yes, I am going to time the picture and that will happen very shortly, since we have such a quick release. That's good for me because normally a cameraman will finish a picture and by the time the timing phase comes up, he'll be off on another picture and won't be available. I've been fortunate enough on my last two pictures to be able to be there when the timing occurred. I must say that I think it's an invaluable experience for a cameraman to be able to sit in with the laboratory on the timing of his picture. It gives him a much better understanding of his negative and the color values he is dealing with. Unfortunately, a lot of cameramen don't get the opportunity to do that.

QUESTION: I realize that "JAWS 2" is primarily an exterior film, but would you care to comment on some of the interiors you had to shoot?

BUTLER: Because we knew we would be faced with shooting on water for so many days, we decided to construct all of the interiors of the film as cover sets. Since we were depicting a New England area, but shooting it in the Florida pan-

handle, they didn't have the type of practical interior locations that would be architecturally suitable, so we built everything. I've shot a lot of pictures in practical interiors, but I must say that if you want total control, there's nothing like a studio set.

QUESTION: Were your interior sets built in a Florida studio?

BUTLER: Unfortunately, no. They were built inside a Pensacola warehouse, which didn't make the soundman happy. It didn't bother me that much, because I was sort of used to having sets built inside all kinds of places on location. I did one other picture ("MISSOURI BREAKS") where that was the case and the soundman went crazy, too. Obviously it's not an ideal situation, because you don't have the height space that you need and, a lot of the time, not even the width, but at least it's better than practical interiors. While this picture was frustrating for me, it certainly had to be even more frustrating for the soundmen, because I would imagine that 95% of the dialogue will have to be looped. That's going to be very difficult for the director, because a majority of the cast are young kids with very limited acting experience. Even for seasoned pros looping is not easy.

QUESTION: Was there anything unusual about the interior lighting you used?

BUTLER: In keeping with the visual style of showing everything as warm and appealing, the interior lighting had to be on the warm side, too. With that in mind, I wanted almost all of the interior work to simulate either early morning or evening, so I used a lot of coral filters on my lamps to create that kind of warm feeling.

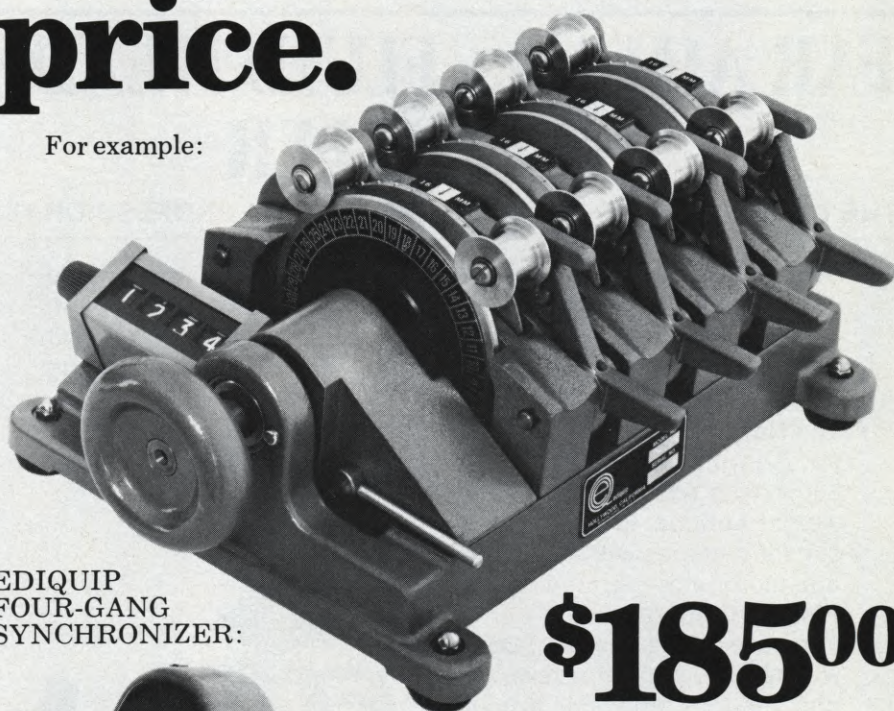
QUESTION: Did you use especially long lenses on this picture?

BUTLER: I was able to use up to a 500mm focal length lens on the water. The Tyler Gyro Platform will handle a 500mm very successfully. However, I wouldn't want to go longer than that even with such an excellent piece of equipment. But up to 500mm it was sensational and it made it possible to get shots from the water that I couldn't have gotten without it. We did use a longer lens on the beach, but never on the water. I was able successfully to use a 1000mm on land to shoot sailing montage footage, but it had to be securely tied down to resist a stiff wind.

QUESTION: I note that you used the anamorphic format on "JAWS 2". Do

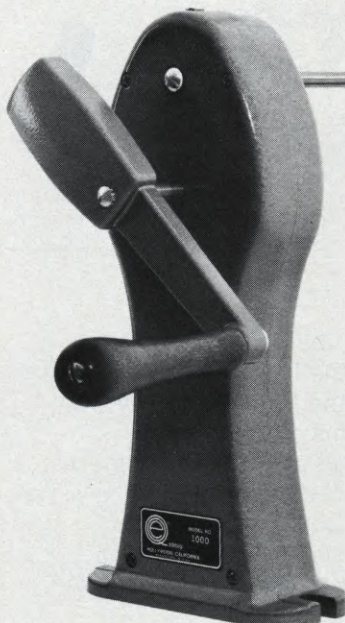
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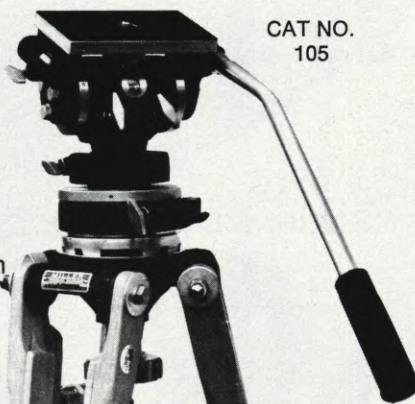
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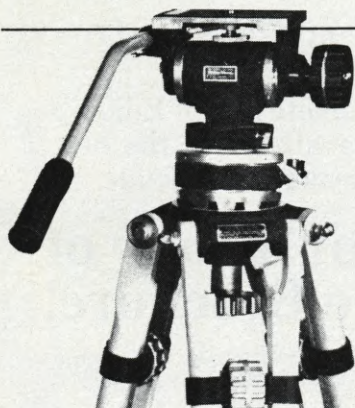
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you have any personal preferences when it comes to format?

BUTLER: I must say that I'm not a great advocate of the anamorphic format when it comes to composition. I must be honest in saying that I fought against it for this picture, but since it had been used for the original "JAWS", which was so successful, the producers felt that they didn't want to change the format. I can understand that, but the anamorphic is a very, very difficult format in terms of composition. In my opinion, even 1.85 is not a great format, but it brings us a bit closer to good composition. Anamorphic is almost a different medium, because it forces the director and cinematographer to think very differently in staging action and planning composition. It's much more difficult and you are always compromising in order to conform to that strange aspect ratio. The argument goes that it's great for vistas, and for a picture like "LAWRENCE OF ARABIA", where you've got vast desert horizons, I would say: maybe so. But for a picture like this, where you have tremendous horizontal and vertical elements (the sea and the sailboats), it is horrifying as a composition. I don't care what quality advantages you may have in terms of extended negative area, you lose all that and more in the compositions. I am a great believer in strong composition and I think that anamorphic is very limiting in that respect. I truly do. If it were up to me, we'd shoot full aperture. After all, have you ever seen an artist paint in an anamorphic format?

QUESTION: Now that the grueling year you've spent on "JAWS 2" is actually coming to an end, do you have any final thoughts on the project?

BUTLER: Only that working constantly on water is demoralizing, totally demoralizing. Trying to sustain your energies and hold a positive attitude, while attempting to press forward under such conditions is very hard to do. I'm sure there has never been a more difficult picture to shoot than "JAWS 2". Thinking back over all the pictures I've seen, I can't imagine a more difficult project, or one that presented more problems. I worked on one that I thought was the most difficult ("TORA! TORA! TORA!"), but this surpasses it. At least on that one you had your feet on the ground. ■

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**"CEMENT MIXER" RIG
FOR FILMING "JAWS 2"**
Continued from Page 359

necessary, but we do roll it enough to get our horizon line corrected. The outside ring that is fastened could also be made to turn 360°, if you wanted it to turn that far, but we use it to keep the module in a level position at all times at various depths and coming up out of the water. The camera operator has to tilt to maintain his framing and he's able to tilt up or down, but the horizontal, or "panning", line-up is governed by the boat operator.

The camera has its own power supply, but the module is powered by air from an air compressor that we have aboard the vehicle. The camera operator is fed air from the surface of the boat by means of a hookah rig, but there's also room enough in the module for him to work inside with a SCUBA tank on his back.

The module is mounted on an arm with pins and a couple of shims on the sides and there's a winch in back of it. When the winch is released, that allows the heavier end to drop into the water and the module tilts up, shooting toward the surface. The action is reversed when it comes up again. The operator is able to pitch at any angle to compensate as he goes down. It would be impossible to do that with the parallelogram you have on a Chapman crane.

The operator has control of two air motors. One of these revolves him and the other can tilt up and down. In one hand he holds the roll control and in the other he holds the tilt control. He also holds the operating grip of the camera, which is rigidly mounted. He can start at a point about six-and-a-half feet underwater and then come clear up and out and shoot two or three feet above the surface of the water. It creates a very believable effect of the shark diving out of and back into the water.

We have used the "cement mixer" to shoot the subjective point of view of the shark for all of its attacks. The reason these shots are particularly important is that the mechanical shark that we have mounted on the platform cannot move fast enough. Its exit out of the water and its attack motion are very slow, so these subjective shots are very important in the sequences where the shark is attacking boats and people. They will be a great help to the editor.

The effect of the shots made with our "cement mixer" is quite spectacular. When we sent the first tests we made with it to the lab, the people there wanted to know how the hell we shot it, because we were really going quite fast and keeping up with a water skier on the surface. ■

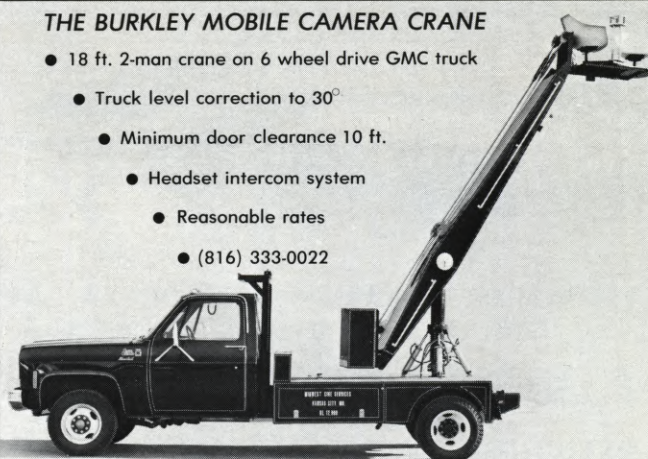


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**FILM STILL STRONG MEDIUM
SAYS KODAK AT SEMINAR**
Continued from Page 375

producing movies for television hadn't even occurred.

"Technological advancements in film equipment and emulsions are responsible for the medium's continuing strength," Sweeney said. "The introduction of Eastman Ektachrome video news film 7250 last year was just the latest in a long series of technological leaps forward that have occurred during the past two decades. The trend has been towards the evolution of faster, finer grained films with shorter, simpler processes, complemented by the development of more portable and rugged sound cameras. And I don't think we have seen the last of these developments."

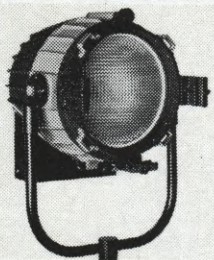
Troutner pointed out that from the start, Kodak's commitment to the industry has included technical support. Film engineers from Kodak have helped install hundreds of film processing machines, and have been involved in helping to train TV station camera and lab personnel. They also provide open two-way communications with the industry. The division now has 50 motion picture engineers in the field.

Bruno pointed to similar trends in entertainment film production for television and theaters. "Twenty years ago, the film production industry was in real trouble," he said. "Fewer pictures were being made for theatrical release, and the industry at best had a trial marriage going with television."

"Today, the entertainment film market for theaters has stabilized," Bruno continued. "We have never returned to the pre-television days of making 400 to 500 features a year, but the motion pictures being made today are bigger, and they reap much larger profits. At the same time, filmed programs for television, including series, mini-series, specials and movies have become a major force in the industry."

"While some experimenting with electronic production has received a great deal of press attention during the past several years, technological advancements in filmmaking have actually had a tremendous impact on the kinds of features and programs being made and shown," he said.

Here, too, the trend has been toward faster, finer grained films with shorter, simpler processes. These developments have been complemented by advances in intermediate and print films, laboratory techniques and equipment, and in motion picture production equipment. "Just think what would have happened if we had frozen our search for better tech-



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nologies twenty, ten or even five years ago when some of 'the experts' insisted the future belonged to electronic production," Bruno asked.

Roger-Smith pointed to commercials as another area where film technology and production are more than holding their own. He said that as many as 25,000 national and regional TV commercials are produced annually, and a recent survey conducted by the division showed that some 85 percent of these are originated on film. Roger-Smith added that the more creative commercials seemed to be on film, pointing out that 94.3 percent of the CLIO finalists last year used film as an originating medium.

He noted that new technology has played an important part in the broad acceptance of film for producing regional and national commercials. "There has been a growing acceptance of 16mm color negative as a format for producing commercials," he said. "One factor is that there are now commercial laboratories in every part of the country providing 35mm and 16mm processing and related services. This has pretty much neutralized immediacy as an important advantage of videotape production."

The same survey indicated there are some half million locally made commercials each year, and around 40 percent of these are originated on film with the rest live or produced on videotape. "It is clear that much more film is being used for commercials than five or 10 years ago," Roger-Smith continued.

What about long-range planning? "With respect to the future, we are not limited in any way to film imaging," said Schafer, a specialist in product planning.

Spin Physics, an Eastman Kodak Company subsidiary in San Diego, Calif., manufactures instrumentation and video recorder heads. "The company has advanced the state of the art to the point where their refurbished video recorder heads last longer and perform as well as or better than the original equipment," Schafer said.

Kodak is, in addition to extensive photographic research, also doing advanced work with laser recording, solid state imaging and videotape-to-film technologies. One division of Kodak is marketing a computer output microfilmer which transfers images to film at computer speeds using a laser. Kodak has made its research work in tape-to-film transfers available to other manufacturers, and improved videotape-to-film equipment reflecting these contributions is already on the marketplace.

"The point is that our commitment to film technology is not based upon a lack of alternatives," Schafer said. "We be-



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lieve technology should be the servant of our perceived needs of the entertainment film production and TV industries rather than the master. While research is on-going in many areas, product development has always been in line with what people working in the industries tell us they need."

The impact is worldwide. For example, both BBC and CBC are now producing many of their entertainment programs with Eastman color negative II film 7247. "GRIZZLY ADAMS" is currently the only prime-time television program in the United States originated in the 16mm negative format, though there are syndicated programs taking advantage of the new technology. Bruno interjected that he doesn't anticipate any major shift in entertainment film production in the United States to the 16mm negative format, mainly because many programs produced for television have the potential of being used in other formats including theatrical releases.

"With today's state of the art, a 35mm original negative provides much more flexibility for making release prints in different formats," he explained. "Also, the cost-savings might not be significant enough to producers already equipped to work in the larger format."

However, 16mm negative film is making an impact on lower budget productions, and in situations where there are real benefits to working with smaller format equipment. "I don't think we have begun to see the full impact of advances made in 16mm color negative film technology," Bruno said. "One exciting possibility is that we see the evolution of more regional film producers creating movies for theaters in their areas."

Schafer summed up, "Our role in partnership with the entertainment film and broadcasting industries has been to dream with them rather than for them. No equipment, film or videotape manufacturer is ever going to determine how pictures should be made or shown. The producers and distributors of entertainment films and news programs are going to continue making those decisions. Our role is to provide the best tools we can for them to achieve their goals." ■

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Continued from Page 334

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"F.I.S.T.", a Norman Jewison film starring Sylvester Stallone, Rod Steiger and Peter Boyle, has been set as the Opening Night presentation for the 1978 Los Angeles International Film Exposition (Filmex), it was announced by Filmex Director Gary Essert. The United Artists release will have its World Premiere at Filmex on April 13 at Plitt's Century Plaza Theatres in the ABC Entertainment Center, Century City.

The Opening Night Gala including the fund-raising film premiere and Filmex Society Benefit Ball is a Filmex tradition. Tickets for the black tie event (\$125.00 each) are available now by calling 556-3535.

Filmex, one of the world's largest and most respected international film festivals, is a cultural event which has grown rapidly because of the significant and innovative support from the professional Hollywood entertainment community. The annual Exposition is presented by The Filmex Society in association with the City of Los Angeles.

Filmex 78 will present over 250 films representing 40 nations and will be attended by over 115,000 people.

"F.I.S.T.", which also stars Melinda Dillon, David Huffman, Kevin Conway and Tony LoBianco, was produced and directed by Norman Jewison. Gene Corman was Executive Producer, with Patrick Palmer as Associate Producer. The screenplay is by Joe Eszterhas and Sylvester Stallone from an original story by Joe Eszterhas.

The film spans three turbulent decades in the growth of the American labor movement. Its story follows one man's climb out of the streets to a position of great power.

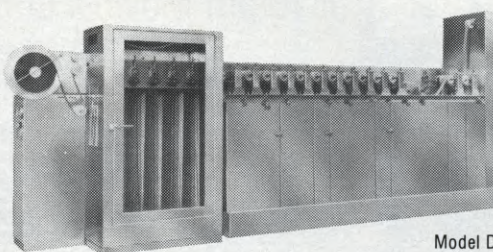
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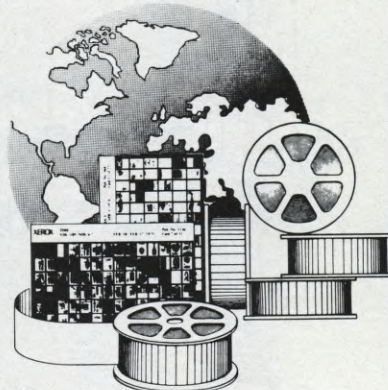
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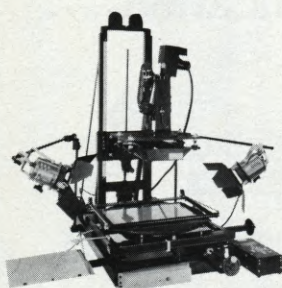
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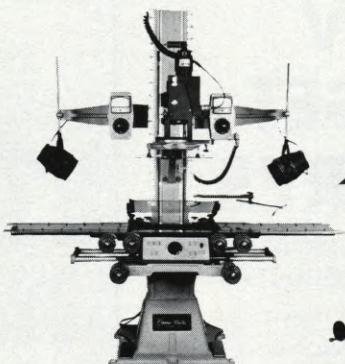
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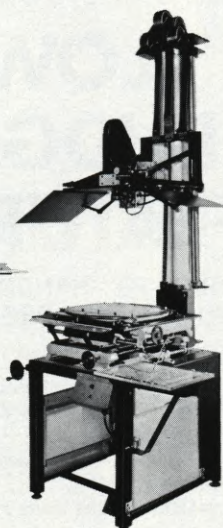
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selves and Gardiner concerned the level of detail to which the clay should be sculpted. In one sense, whether or not to have clay "hair" on the head of that last little figure sitting in the back row of an auditorium filled with thousands of other little clay figures is largely an artistic question.

In another sense, however, when the medium (television) in which this art form is to be displayed is taken into account, it becomes a technical consideration as well. Obviously, shooting in 16mm for eventual release on TV limits the viewer's ability to pick out small details as compared with, say, shooting in 35mm for large screen theatrical release.

One requirement of the client that directly related to this question was to have the audience filled with "recognizable" characters of various celebrities from the entertainment world (Frank Zappa, John and Yoko Lennon) as well as political figures (Jimmy Carter) and a number of writer/reporters (Ben Fong-Torres, Hunter S. Thompson, Paul Scanlon, Annie Leibovitz, Delores Ziebarth, Jann Wenner) from *Rolling Stone Magazine*. How do you render this number of people in clay, give them no more than 10 seconds total screen time in what amounts to a cutaway, and yet have them all clearly recognizable to the television audience who will get only one chance to make all the necessary identifications? The answer, of course, is that you don't.

In this case the amount of detail called for in the storyboards simply exceeded the capabilities of the medium. This is not to say that, therefore, these shots don't work in the context of the sequence. It just means that everyone will see something different. Some people will recognize only Jimmy Carter, others may be able to pick out John and Yoko, but no one will see everything there is to see from a one time only viewing.

Does this mean that too much detail has been put into the animation? It's tempting to think so in the middle of a hectic shooting schedule that allows no time whatever for errors and retakes. However, in the final analysis we came to no real resolution of this question. It is certainly within the animator's artistic prerogative to strive for detail that only enhances his own satisfaction. Whether or not that effort is always economically expedient on a commercial project such as this, it is nevertheless a factor that must be taken into account.

The process of shooting the actual animation was for the most part pretty straightforward. We averaged approxi-

mately two days to complete a given set-up. Of that two days, perhaps a day and a half was devoted to building the set, sculpting the characters, setting up the lighting, programming the camera moves and doing a camera test. The final shooting was all done in the remaining half day with some of the easier set-ups in as little as one hour.

Basically, the camera was always moved in one-frame increments. The clay animation varied between one and two frames per movement. Some of the more precise movements, such as the actions of the dummer, were animated one frame at a time, while the crowd shots (which called for fewer specific actions) allowed for exposing two frames of film for every incremental move of the clay figures.

Once shooting was underway, everyone other than Bob Gardiner was assigned a function that contributed to the movement of the camera. During a typical shot, one person would rotate the table upon which the set was built, another person would turn the cranks that moved the camera bed and a third individual would make the exposures by pressing the button on the animation motor control box. A very definite step-by-step routine had to be established in order to assure that each function was performed for each exposure.

We soon discovered that it was amazingly easy to become distracted by Gardiner's artistry in moving the clay between exposures to the point where it was very difficult to remember, say, if the rotisserie device had been turned the necessary increment since the last exposure. Omitting a movement or doing a double movement between exposures would obviously produce an unacceptable "glitch" in the shot.

In the end, of course, we finally got it all down on film pretty much the way Gardiner had conceived the sequence. In fact, in a few instances there was quite a remarkable correspondence between the storyboards and the final compositions as they appeared in the film.

There was one big disappointment that we all suffered, however. After all the days and nights of toil and strain, I think we all had in the back of our minds that we had produced a real epic. But it all goes by in just 45 seconds.

Gardiner's art cries out for a more leisurely format. He and Mason Williams have just completed a feature-length script that should give the public a much more comprehensive look at this unique art form when finally brought to the screen. There are a few details to be taken care of before that can happen though . . . about two years, a million dollars or so, and a lot of clay. ■

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TWENTY NIGHTS IN CLAY

Continued from Page 401

"metamorphose" from one into the other. To utilize this style effectively, the artist must develop a "feel" for how much to change the clay between frames that can only come from practice and experience.

The *Rolling Stone* effort was largely a combination of these two approaches, in the sense that the movements were all carefully scripted out on an animation log, but no reference film was used. To a large extent the rhythm to which the clay characters moved was a product of Gardiner's expertise at approximating what would have happened in a live action scene had that been available. It saved us a great deal of time not having to log a reference film where there could have been as many as fifteen or twenty variables to deal with between frames.

The music track (by Jim Webb) had already been laid down by the time we started the animation, so there was an inherent rhythm to be dealt with in terms of how to move the clay musicians. However, since there were no really long takes, it was easy to cover the few discrepancies between the beat of the music track and the rhythm of the clay musicians at the editing stage.

In the process of drawing up our first production schedule, it quickly became apparent that our over-all time constraint limited us to only one camera test for each set-up. These tests would help us zero in on how fast the camera should be moving and the rudimentary motions of the clay characters were approximated. No detailed clay sculpting was undertaken at this point.

Gardiner had previously devised a method for transporting the camera, consisting of a general tripod head mounted on a six-foot-long screw movement device that somewhat resembles a converted lathe bed. In addition, the sets could be placed on a "lazy susan" capable of handling all but the very largest backgrounds. The combination of these two movements gave the camera the ability to roam freely in a horizontal plane the rough shape of a circle six feet in diameter. Of course, the geared head gave the camera full pan and tilt capabilities as well.

Many of the camera moves dictated by the storyboards had been specifically formulated to take advantage of this system of camera movement, so we shortly discovered that the biggest single problem, from a cinematic point of view, concerned another area . . . lighting. One of the big problems of lighting clay animation is that clay responds in a very funny way to the heat generated from standard sized (500W-1000W) quartz





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lights . . . it melts! We therefore chose to use smaller, and thus cooler, lamps in the range of 100W to 300W. The Mole-Richardson Mini-Mole series of lamp housings and accessories proved ideal for this purpose.

Even with these low-intensity light sources it would have been possible to use ECO (7252), since the Bolex camera, when used with an animation motor, gives single-frame exposures in the neighborhood of 1/4 to 1/3 of a second. However, we determined that the effect we wanted called for maximum depth of field with no areas of soft focus in the frame, so lens apertures in the range of f/8 were necessary. This made ECN (7247) mandatory. With the occasional use of a one-stop neutral density filter, we were able to always keep our lens opening set between f/8 and f/11 . . . an ideal setting for maximum lens sharpness, also.

One panel of the storyboard called for the camera to start fairly tight on the face of the lead guitar player, pull back while starting a dolly to the left (thereby establishing the band in a wide shot); continue dolly left around behind a row of amps where a "roadie" is seen making hasty repairs to a piece of electronic equipment; and come to rest looking out between two of the amps, over the drummer's shoulder, and framed on the bass player who is just completing a riff.

Lighting this shot was our greatest challenge because the set had to rotate throughout the shot, and yet the viewer has to have the illusion that only the camera is moving in order for the shot to work. This meant that all the lights had to be mounted to rotate with the set; otherwise, shadows would creep as the set turned, thereby giving away how the shot was done. We retained one small stationary light behind the camera for fill but everything else turned with the rotating table.

Without exception, every light had at least one colored gel mounted in front of it with some type of additional diffusion material (either screens or frosted gels), barndoors, gaffer-taped scrims, and occasionally a snoot to produce spotlight effects. The end result was very close to the type of lighting currently in use at many rock concerts . . . front spot lighting with lots of colored rim lights. The only thing we added that wouldn't be there in "real life" was a little fill to bring some of the detail out of the shadows—a necessary concession to the latitude characteristics of the film emulsion.

With most of our lighting and camera movement problems solved, the one remaining area of contention between our

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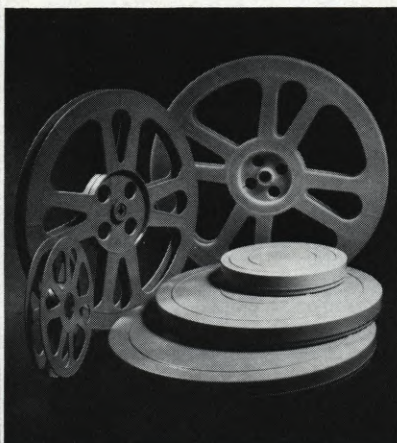
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SUPER-8 ... THE HARD WAY Continued from Page 371

though it had been processed in a garbage can! There was so much dust and bits of trash adhering to the surface that the other distressing faults of this film—the constantly shifting color and the images that jumped as though the projector had not been properly loaded—were not apparent at first. And my long distance call to the company accomplished nothing to soothe my anger and dismay. They assured me that they inspect every order before it is sent out; and mine, according to their records, was in perfect condition.

Then later, to round out their record of malpractice, I discovered while editing the film that they had scratched and marked some of the original footage with a grease pencil. There was no recourse. No wonder they required advance payment on all orders.

However, my complaints against this particular laboratory should not be construed to suggest that all labs specializing in Super-8 film services are guilty of rip-off policies. But my experience does imply that one should choose a reputable laboratory with services listed at "believable" prices.

WINDUP AT LAST ... AND MORE PROBLEMS!

An hour of film was finally cut down to about twenty minutes by editing very closely to the script and recording the sound track—consisting of music, narration and sound effects—directly onto the magnetic stripe applied to the film edge. This completed the production. I was then ready to have several prints made for the college library file. At this point I felt pretty happy about the whole thing and was serenely ignorant of another costly mistake waiting to jump me.

When I began the production I had decided on the two Kodak color film stocks in most common use at the time—Kodachrome II (daylight) and Kodak Ektachrome 160 (type A). I knew that the first of these Super-8 stocks would be ideal for the outdoor scenes, rendering perfect color and contrast, and the latter film stock would be used to shoot the interiors, because its high speed enabled us to work in low or natural light situations. The decision to use these two types of film proved highly successful; the results projected beautifully on the test screen. But when I sent the completed documentary to the George Colburn Laboratories in Chicago, they informed me that to make a Super-8 print they must know which film stock I had

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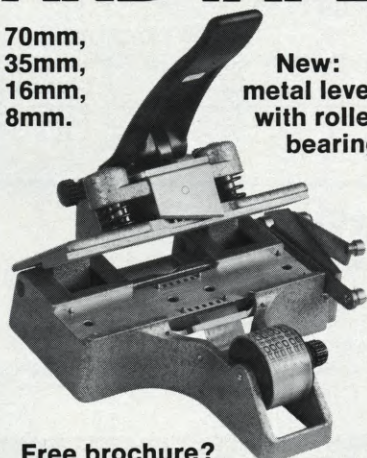
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used throughout the movie.

When I told them I had shot both Kodachrome and Ektachrome, they said they could only make a print by color correcting for just one film stock or the other. In other words, the duplicating stock they use to make the prints is normally color balanced for only Ektachrome. It can be filtered to reproduce Kodachrome, as well, but Kodachrome II and Ektachrome 160 cannot be intermixed when making a print.

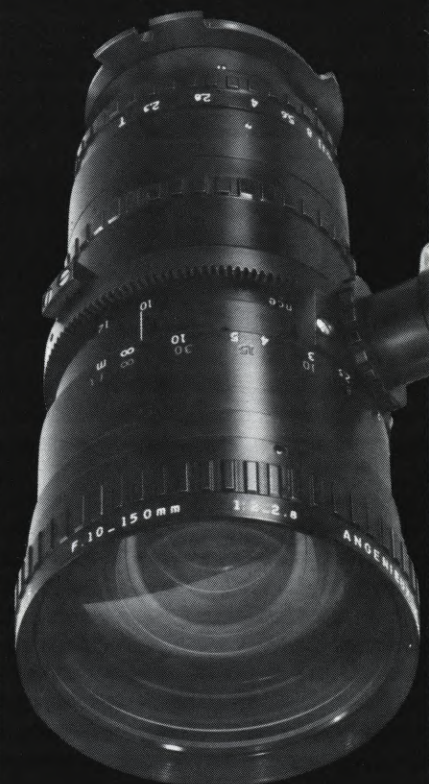
They suggested that they color correct for the film stock which was predominant throughout the film. I decided that they should color correct for Kodachrome II, since the exteriors offered much more beautiful colors and contrast than did the Ektachrome scenes. By making this decision, all of the Kodachrome scenes had perfectly matched color, while all of the Ektachrome film cast a light bluish-green haze over its scenes. If I had chosen to print for only the Ektachrome, the Kodachrome scenes would have had a reddish appearance, particularly the skin tones, while the Ektachrome stock would have appeared normal.

All of this worry could have been eliminated if I had used just one kind of film for the entire movie. For instance, I could have used the Ektachrome high-speed film to shoot the interiors and then, still using the Ektachrome stock, I could have put a type 85A filter over the lens of the camera to shoot the exteriors. This would have given almost perfectly matched color in every scene, and would have enabled the lab to make nearly exact color-corrected duplicates. Hindsight is a wonderful thing!

A NEW HAT ... AND DOUBLE EXPOSURE

This seemed to me less than a perfect windup for my Super-8 documentary, I told myself in moments of candid introspection. Yet I felt that I had cause to feel pretty good about the whole production. In fact, I enjoyed some mild elation—for about two days. Then the cold light of reality broke through, and I realized that I was still far from the end of this project. For I was not only the author, director, producer and cameraman—dear old AJC also expected me to put on a PR hat and function as the movie's publicity manager and spokesman. Oh, I had given some passing thought to the promotional phase of the movie on campus and in the community. Knowing that any news story is more interesting when accompanied by visual media, I had taken various black-and-white and color photos during production—in the studio, on location—and had included shots of our personnel. And I had also asked a local TV "talk show" producer for a spot

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on her noonday program.

This much I'd anticipated—and then relaxed. Now I had the whole bag in my lap—writing news releases for the press, radio and television stations, negotiating for advertising and poster displays—and seeing that it all got put together well ahead of the premiere showing date. And with the memory of my recent sins of ignorance and miscalculation still fresh in my mind I was determined to give "ALBANY JUNIOR COLLEGE, A NEW BEGINNING", my utmost of resource and energy.

Most press, radio and television news departments want short, concise information for their news releases: "AJC STARS IN LOCAL FILM . . . The campus, facilities and activities of Albany Junior College are the subject of a documentary motion picture recently completed by local filmmaker, Jack M. Sell . . . This twenty-minute sound film will premiere Thursday evening at 8:00 p.m., in the College Union Building. It depicts the social and academic life of the school and will be used for promotional and orientation programs. . . ." This release brought quick action from a radio station. I was interviewed by phone at 6:30 a.m. and the tape was broadcast a half-hour later. This was a bit disconcerting—I imagined that I could hear myself mumbling through crumbs of toast and cereal—but it was soon over. The real drag was the poster campaign.

Announcements in the news releases could not guarantee anything like total exposure for the premiere showing of the film. After all, I figured, everybody in town would not be reading, listening or viewing the news at precisely the moments when the word about my production hit the street and went on the air. My best chances for attracting attention rode on the big red and white posters I had been somehow wise enough to have printed (courtesy of AJC's printing department). For a while this foresight made me feel a bit smug. But as I led my crew of volunteers all over town soliciting display space in shop windows—with only three days to go before THE DATE—fatigue and heat really bore down. We all felt vaguely depressed and wondered if our efforts could possibly attract a substantial audience to "ALBANY JUNIOR COLLEGE, A NEW BEGINNING".

But I had no time for this morbid reflection; there was the television appearance to prepare for—the noonday talk show I'd set up. Was I ready? And what could I do wrong? At the moment the possibilities seemed infinite.

The fifteen minutes I was on the air, armed with a packet of information—news clippings, photographs, a resume of myself—seemed like an hour. I had

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also brought along the original film, because WALB-TV had just installed a Super-8 color film chain and expected to show segments with the interview. But I remember practically nothing after the studio director signalled that we were on the air, which I thought was much too soon. Doesn't everyone, the first time? I just took a deep breath and hoped I was replying intelligently and calmly to the many questions my interviewer asked.

When those fifteen minutes finally ended they led me, numb and a little slaphappy, out of the studio. The only thing in my mind was a fervent prayer that a respectable audience would show up at the AJC auditorium.

"AND NOW, LADIES AND GENTLEMEN . . ."

This is where you came in—and found me listening to our college president's gracious welcome. He was addressing quite a large audience. Well, at least my publicity and promotion efforts had produced some tangible results. And the documentary itself? It must have been pretty good; nobody walked out during those twenty minutes. And after the showing, when a healthy round of applause lured me up to the podium, I recited a list of "thank you's" like a seasoned Oscar winner.

No doubt about it, this was a proud moment in my life. Only later, alone in my room, grim memories sneaked back—the struggles with my tiny budget, my ridiculous rock concert fiasco, the lab rip-off that almost spelled disaster, the not-too-happy looks I got when my assistants and I invaded the classrooms with lights and cameras. These will probably fade with time, but I still break into a cold sweat when I linger over my recollections.

I keep telling myself I have achieved a valuable learning experience. To be kind to myself, I might call my methods a pragmatic approach. And I somehow got the whole thing together without being rushed off to a trauma center. Quite a number of people around AJC seem to be pleased with their "NEW BEGINNING". But I still think I did it the hard way!

(ABOUT THE AUTHOR: Jack M. Sell is currently film and television director at the Michael Reese Medical Center in Chicago and President of Cosmopolitan Productions, a film company specializing in commercial and industrial movies. Prior to this, he worked in Georgia at WALB-TV as a television director. "ALBANY JUNIOR COLLEGE, A NEW BEGINNING" received an Honorable Mention in the Senior Category at the Eastman Kodak Film Festival in Rochester, New York last year.)

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LENS DATA PROGRAMING WITH A HAND CALCULATOR

Continued from Page 361

the calculator reached a distance too large for it to handle and overflowed. Whenever the number in R3 is negative you can safely assume that the focal depth-of-field distance will be infinity.

Sometimes the display will show number like 5.12. Obviously 5'12" is the same as six feet. What has happened is that the calculator has rounded off five feet, eleven and some fraction of an inch (0.5 inch or larger) to 5'12". If you press, FIX, 9 you will see the exact number. Digits before the decimal point are feet the first two after it are inches and everything past two digits are fractions of an inch. Pressing f, FIX, 9 when the lens displacement is displayed will show you the exact amount in inches that you need to space the lens forward of the normal infinity focus position, for the subject distance you keyed in.

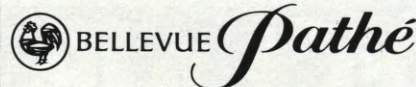
Finally, you may discover that the data this program provides you with differs slightly from the depth-of-field chart published elsewhere. I assure you that this program's data is exactly accurate because it is based on the formulas used to produce the chart data and is able to work these formulas to nine decimal places instead of the three decimal places of the chart maker's slide rule. As for the charts, well, the authors of those charts are going to have to provide their own excuses. I have not encountered any errors in any of the charts which are really significant enough to cause problems though.

One of the best features of this program is that you won't have to guess when your f/stop, focal length or subject distance isn't given in a chart (i.e. trying finding f/3.2, 1200mm or 3'4.5").

Another useful feature is being able to compare lenses in one format to lenses in another in terms of the horizontal angle of view. You will also find the lens displacement data useful for determining exposure increases when shooting extreme close-ups.

While this program does accomplish quite a lot, it in no way exhausts the possible uses of a programmable calculator in film or video production. Other programs could be written to convert time to foot-ages to frames, or for determining exposure with shutters set at other than 180 degrees or for under/over cranking or close-ups or filter factors, or special effects work to determine model sizes and shooting speeds. The only real limits are your ability to quantify data and your programming ability (which develops quickly with experience).

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